HOUSE OF COMMONS SESSION 1992–93

DEFENCE COMMITTEE

Sixth Report

THE PROGRESS OF THE TRIDENT PROGRAMME

Report, together with the Proceedings of the Committee relating to the Report, Minutes of Evidence and Memoranda

Ordered by The House of Commons *to be printed 16 June 1993*

LONDON: HMSO

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The Defence Committee is appointed under SO No 130 to examine the expenditure, administration and policy of the Ministry of Defence and associated public bodies, and similar matters within the responsibilities of the Secretary of State for Northern Ireland.

The Committee consists of a maximum of eleven Members, of whom the quorum is three. Unless the House otherwise orders, all Members nominated to the Committee continue to be members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint persons with technical knowledge either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other Committee appointed under Standing Order No 130 and to the Committee of Public Accounts its evidence and any other documents relating to matters of common interest; and

(d) to meet concurrently with any other Committee appointed under Standing Order No 130 for the purpose of deliberating, taking evidence, or considering draft reports.

MONDAY 13 JULY 1992

The following were nominated Members of the Committee:

Sir Nicholas Bonsor
Mr Menzies Campbell
Mr Churchill
Mr Michael Colvin
Mr Frank Cook
Sir Nicholas Fairbairn
Mr Bruce George
Mr John Home Robertson
Mr John McWilliam
Mr Neville Trotter
Mr Peter Viggers

Sir Nicholas Bonsor was elected Chairman on 15 July 1992.

The cost of printing and publishing this Report is estimated by HMSO at £6,566.
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SIXTH REPORT

The Defence Committee has agreed to the following Report:

THE PROGRESS OF THE TRIDENT PROGRAMME

I. INTRODUCTION

Background

1. On 3 March 1981 the House of Commons endorsed the Government's decision to procure the Trident missile system in place of Polaris as the nation's strategic nuclear weapons system. Twelve years on, that decision is bearing fruit, with VANGUARD, the first UK Trident submarine, having completed contractor's sea trials. Over the intervening years, successive Defence Committees have scrutinised the progress of the programme and associated issues, including its industrial and employment implications, and developments at the Atomic Weapons Establishment (AWE). This is the latest in that series of reports, founded primarily on the oral and written evidence provided to us each year by the Ministry of Defence. We have this year also visited AWE Aldermaston to discuss with all involved the effects of the full introduction on 1 April 1993 of contractorised management. We are grateful for the assistance given us in the course of our inquiry and our visit to Aldermaston.

Progress

2. As has been the case for several years, MoD reports that the programme continues to make good progress; it "remains on time and within budget to enter service from the mid-1990s".[1] The detailed evidence presented to us confirms this general picture, and that there has again been a small real reduction in the programme cost. As Rear Admiral Irwin, the Chief of the Strategic Systems Executive, noted, it would be remarkable if there were no concerns or difficulties in such a complex and expensive programme.[2] The completion of the programme is a top priority for the Department; that has no doubt helped.[3] **In general terms, we can confirm that the programme is progressing well.**

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[1] Evidence, p 21, para 1: Q1437.
[2] Q1437.
[3] Qq 1451–2.

TABLE I

Changes in the total estimated cost of the Trident programme

Date	*Hybrid Cost** £m	*Total Forecast spend in UK* £m	*Non-Hybrid Costs†* £m	*Price/ exchange rate ($=£1)*
November 1981	7,520	4,207	7,520	1981–82/1.87
February 1983	6,982	4,200	6,984	1982–83/1.78
March 1984‡	8,544	4,800	8,729	1983–84/1.53
January 1985	9,241	5,142	9,285	1984–85/1.38
January 1986	9,787	5,392	9,869	1985–86/1.28
January 1987	9,191	5,786	9,265	1986–87/1.50
January 1988	8,948	5,814	9,043	1987–88/1.62
January 1989	8,950	6,166	9,089	1988–89/1.76
January 1990	9,038	6,477	9,380	1989–90/1.62
January 1991	9,274	6,999	9,863	1990–91/1.56
January 1992	9,571	7,577	10,518	1991–92/1.59
January 1993	9,596	7,867	10,676	1992–93/1.74

* *Hybrid Costs* are those where expenditure already incurred is included at the incurred or historical price and exchange rate, with unspent balances, ie current year and future expenditure, expressed at current prices and exchange rates.
† *Non-Hybrid Costs* are those where all past expenditure and current year and future expenditure is expressed at a current price level and exchange rate (as shown)
‡ The March 1984 figure was the February 1983 figure revalorised, but using US inflation figures which later proved to have been overstated.

TABLE II

Changes between 1982 Estimate and Current Estimate

	Estimated cost £m	*Expenditure in US* £m	*UK* £m
November 1981 Estimate (September 1981 prices, $1.78)	7,520	3,313	4,207
Inflation	5,848	1,843	4,005
Exchange Rate Variations	119	119	—
King's Bay Changes	−1,035	−323	−712
Real Changes	−1,775	−2,142	367
Current Estimate (1992–93 prices $1.74)	10,676	2,809 (26%)	7,867 (74%)

3. Our predecessors concluded in their 1992 Report that the justification for Trident, the number of warheads to be deployed and the "relationship of the scale of the strategic deterrent to that deployed by any potential enemy" were legitimate political and military issues.[1] We have explored the facts behind some of those concerns in oral evidence, and believe that several matters should be drawn to the House's attention.

4. Not only has no decision been made as to how many warheads, or how many missiles, each submarine will carry, but the number can be varied from 0 to 128 warheads, and 0 to 16 missiles, on each mission: **there will therefore not be any one number of warheads but rather a potential variation according to the perceived strategic situation.**[2]

5. **There is no technical reason why Trident missiles should not carry out the substrategic role**, by the firing of a single missile carrying one warhead, whose target could be communicated to a submarine at sea. Although ballistic missiles

[1] 1992 Report, para 5.
[2] Qq 1543–6.

have a *minimum* range, the mobility of the submarine means that this should not act as a significant constraint[1]. The major constraint arises from the need to decide on a particular weapon outload mix when the submarine is in port. We understand that it would be possible to have a mix which provided both a substrategic capability and a credible strategic deterrent.[2]

6. Although MoD have avoided reference to the "Moscow criterion", Polaris and Trident were evidently designed to ensure that they could penetrate Moscow's ABM defences, so that it would hold out a threat to key aspects of the Soviet state's power. **Polaris, as updated by the Chevaline programme, currently provides an effective deterrent, and indeed will have to continue to do so for some years more, until fully replaced by Trident.** Trident was procured on the assumption of potentially enhanced ABM defences through the 1990s and beyond. It may be that, if the dissolution of the Soviet Union and the Warsaw Pact, and the political direction currently taken by the government of Russia had been foreseen in full in 1980, the requirement for Trident would have been less pressing. If, as we are assured, the Resolution class boats armed with the Polaris/Chevaline system are more than adequate for the second half of this decade, it can be asked what developments in either ABM defences or submarine technology are anticipated which require the new Vanguard class boats armed with Trident D5 missiles. The fact is however that we are now committed to both the boats and the weapon systems, and that the new system provides a substantial advance on Polaris. However confident some may be of future global political trends, the United Kingdom will have in service the most advanced nuclear deterrent available, and one that will retain its deterrent capability should potential enemies embark on further upgrading of defences.

Costs

7. We welcome the seventh successive annual fall in the estimated overall cost of the programme. Some caution is required in drawing conclusions from this. The fall is very slight. The programme is by no means completed: in terms of expenditure it is about two-thirds spent,[3] meaning that over £2.5 billion remains to be spent in the UK and over £1 billion in the US.[4] There have been very substantial cost overruns, met by sums originally allowed for contingencies, both within particular parts of the programme, and from a central unallocated fund. The unallocated contingency fund has fallen to £276 million from £345 million last year,[5] and that within programmes from £214 million to £143 million. There is not a great deal of contingency funding left. Furthermore, the scale of the original contingency allowed for suggests a pessimistic—if realistic—assessment of the accuracy of original estimates. We also note that the proportion of the defence budget taken by the Trident programme apparently remains at less than 2½ per cent on average over its 20 year procurement period, despite recent cuts in the defence budget.[6]

Running costs

8. The cost of the Trident programme will of course not end on delivery of the fourth submarine and purchase of the last missile. There will be running costs over the lifetime of the submarines, as there have been for Polaris. MoD has previously stated that the running costs of Trident will be similar to those of Polaris:[7] the Polaris force currently costs around £175 million a year to run.[8] **In response to our query, MoD has estimated that the lifetime operating costs of Trident "are likely to be in the order of £5½ billion",**[9] meaning around £185 million a year over 30 years. This estimate, regarded as reasonably robust, comprises £1 billion for manpower, £1.35 billion for refits, £1 billion for stores and transport, £1.2 billion for Clyde submarine base, £1 billion for AWE and

[1] Evidence, p 34, A17i; Qq 1551–2.
[2] Qq 1547–1565, 1576–1580.
[3] Evidence, p 22, para 10.
[4] *ibid*, p 25, A3f and A3g.
[5] *ibid*, A3e and 1992 Report, para 9.
[6] Evidence, p 22, para 11: 1992 Report, para 11.
[7] 1992 Report, para 12.
[8] Evidence, p 24, A3b.
[9] Evidence, p 25, A4.

in-service support costs, and £150 million for decommissioning and disposal: a total of £5.7 billion.[1] **There are evident uncertainties, not least over disposal, for which there is still no long-term strategy.** The figures assume that each boat will have two refits, rather than the three refits planned for each Polaris boat at a comparable cost of around £170 million each, and, despite the greater size of the Trident boat, of comparable duration.[2] **Now that the period of operation of Trident boats is nearer, we recommend that estimates of lifetime operating costs be included in the Secretary of State's annual Report to Parliament on the programme.**

Jobs and work

9. The peak years of the Trident programme are now almost over, and with them the main employment impact. As our predecessors noted in 1992, the latest estimates of direct and indirect jobs provided as a result of the programme are very substantially below those estimated in 1980.[3] The volume of UK industrial participation in the US Trident programme is also relatively low. The Government's Reply of 1992 shared the previous Committee's disappointment that the value of contracts won by British firms was small in comparison to the overall cost of the US Trident programme, but noted that over half those UK companies which bid for contracts had won orders.[4] A further six contracts worth $8 million have been awarded since last year's figures, making an overall total of $188 million and 563 contracts, against an estimated US spend of almost $5 billion. **The annual remark in the Secretary of State's Report to the effect that opportunities remain for further orders during the production phase of the programme is wearing thin.**[5]

II. SAFETY

Drell and Oxburgh

10. In December 1990, an American expert panel chaired by Dr Sidney Drell, and convened by the House of Representatives Armed Services Committee, issued its report on nuclear weapons safety, concentrating in particular on the D5 missile and its warhead. Several issues were raised of direct relevance to the UK, in particular the positioning of the warheads in the missile's third stage around the motor, the choice of missile propellant and warhead explosive, and the handling of the missile and warhead. Our predecessors examined MoD on these matters in 1991 and criticised MoD's bland and evasive responses in its 1991 Report.[6] In October 1991 the then Minister of State for Defence Procurement announced that the Chief Scientific Adviser, Professor Oxburgh, had been invited to lead a small working group "to review, in the light of any relevant aspects of the report of the Drell Panel in the United States the safety of the present and prospective UK nuclear armoury".[7] The report was received by Ministers in early 1992, and a declassified version placed in the Library of the House of Commons in July 1992.[8] We sought the full version of the Report; in refusing our request, MoD referred to the material withheld for reasons of national security having been kept to a bare minimum, and assured us that they "do not interfere with a proper understanding of the report and its conclusions".[9] While we cannot in principle accept the Government's refusal to provide information to us at whatever level of classification it may be, we accept the assurances that the excised passages of the report are not of critical significance.

Trident

11. In the context of this Report, our principal concern must be the safety of the Trident system, covered in paragraphs 4.4.1–5 of the Oxburgh Report. Oxburgh records that, because of the absence of an alternative team in the UK to

[1] Q1440.
[2] Qq 1441, 1458–9.
[3] 1992 Report, paras 13–15: 1992 Reply, para 5: Evidence, p 21, para 7 and Q1456.
[4] 1992 Reply, para 7.
[5] Evidence, p 22, para 8: 1992 Report, Evidence, p 23, para 8: 1991 Report, Evidence, p 18, para 8 &c.
[6] 1991 Report, paras 10–19.
[7] 1992 Report, paras 23–24.
[8] HC Deb, 13 July 1992, col 521*w*.
[9] Evidence, p 27, A10a.

provide a back-up validation of the studies at AWE, "the Group can offer no definitive view on Trident one-point safety".[1] In evidence to us submitted in February 1993 however, the MoD stated that—

> "The Committee can be assured that our Trident warheads have now been definitively assessed to be one-point safe".[2]

In oral evidence, MoD witnesses confirmed this, and confirmed "categorically" that the Trident warhead was one-point safe, as a result of further work since the Oxburgh report.[3] **We welcome the categorical assurances given to us that the Trident warhead is one-point safe.**

Propellant

12. One of the principal concerns raised in the Drell Report was over the design of the D5 missile, in that the warheads are grouped around the third-stage motor in relatively close proximity to the propellant, rather than above it.[4] The unusually close proximity of inflammable and potentially explosive propellant and nuclear warheads is naturally a matter of concern. It is self-evident that the UK cannot change the fundamental design of a missile it is buying off-the-shelf. It might however be thought possible to select a propellant which would reduce the possibility of an explosion, and to introduce safety features into the warhead which would minimise the dangers of release of plutonium should such an explosion take place. The propellant proposed to be used in Trident D5 is dubbed 1.1 class, a high energy propellant, which has a 4 per cent longer specific impulse, propelling a rocket to greater velocity and therefore longer range. In the case of Trident D5 missiles, the additional range is of the order of 150 to 200 nautical miles.[5] The alternative propellant is dubbed 1.3 class, a composite propellant, which it is practically impossible to detonate.[6] The Oxburgh Report observed, somewhat cryptically, that—

> "We are buying the Trident missile off the shelf from the US and unless the US decide to modify their system our only choices are to use it as it is, or not to let it enter service".[7]

MoD confirmed that these constraints applied to the choice of propellant as well as to missile design, and that—

> "The missile would require major redesign work to accommodate a different propellant, and it would not be practicable for the UK to seek to change the design unilaterally for UK missiles".[8]

In oral evidence, MoD confirmed that, not only would a unilateral change of propellant be very expensive, but that even a bilateral decision to change at this stage would increase costs.[9] Nevertheless, we re-assert the overriding importance of safety, and we would welcome further consideration of an alternative fuel even at the cost of a marginal reduction in range.

Handling

13. The issue of propellant safety arises almost entirely in the context of occasions where the warhead and missile are handled together, primarily on loading or unloading of a submarine. Drell expressed concern at the intended US practice of transporting complete missile/warhead assemblies, compared to the UK practice of mounting warheads onto missiles already in submarines. Oxburgh however felt that"one practice may not be significantly preferable to the other" and recommended continuing studies into Trident missile loading and

[1] The criterion for one-point safety, as set out in the 1990 Drell Report on Nuclear Weapons Safety, is that"in the event of a detonation initiated at any one point in the high explosive system, the probability of achieving a nuclear yield greater than four pounds TNT equivalent shall not exceed one in one million (1×10^6).".
[2] Evidence, p 27, A10b.
[3] Qq 1525–6, 1531.
[4] Drell Report, p 29: 1991 Report, para 12.
[5] Q 1597: Evidence, p 34, A17.
[6] Drell, pp 28–29.
[7] para 4.4.3.
[8] Evidence, p27, A10c.
[9] Qq 1596–99.

unloading.[1] MoD's written evidence referred only to all aspects of Trident nuclear weapon safety being examined.[2] In oral evidence, the Director General Strategic Weapon Systems told us that whichever method was adopted would be chosen "to minimise the perceived risk".[3] **We commend MoD's willingness to reconsider its hitherto preferred method of missile loading and unloading in the light of safety factors, and we look to the Department for continuing openness on the method eventually adopted.**

Safety features

14. The UK has designed its Trident warhead independently of the US, constrained only by the need for its weight and shape to conform to the requirements of the missile design. There is therefore no reason why the UK warhead should not have different safety features from those on the designated US warhead.[4] The Oxburgh Report stated that the Trident warhead system incorporated "state-of-the-art safety technology for the time it was designed", although "a weapon system safer than Trident could be designed today".[5] It also described it as "comparable to, and in some ways safer than, Chevaline".[6] MoD has confirmed that the UK Trident warhead had "more advanced safety features" than Chevaline.[7]

15. Because of the long-standing practice not to reveal "details of warhead design", MoD have refused to reveal in public whether the design incorporates the three principal modern safety elements—Insensitive High Explosive (IHE), Fire Resistant Pits (FRPs) or Enhanced Nuclear Detonation Safety (ENDS) systems. The Oxburgh Report did not recommend particular safety technologies, but proposed that any safety justification or evaluation should be required to show that the use of IHE, FRPs and ENDS had been *considered*, "along with other technologies that might become available within the timescale of the project".[8] **We consider however that the public are entitled to know whether specific and well-publicised safety features are or are not incorporated within nuclear weapons, as is the case in the United States.** IHE has a much lower probability of detonation as a result of a violent accident than conventional high explosive, but more of it is required to initiate a nuclear detonation, meaning greater weight and volume of explosive. The US Trident warhead uses HE, to avoid having to accept reductions in either the number, yield or range of warheads to compensate for the additional volume of IHE required. The scale of the reduction which would be required is of the order of carrying seven rather than eight warheads.[9] The ENDS system, introduced in the US in 1977, is designed to prevent the electrical system conveying a false firing signal, through the insertion of two "strong links", and one "weak link" designed to fail in abnormal environments. FRPs are shields designed to protect the plutonium cores in the event of fierce fire, including burning of the explosive. **The probability is that some or all of these are incorporated in the UK Trident warhead: the onus is on the Government to explain why they, unlike our American allies, are unwilling to reveal the facts.**

Transport

16. The Oxburgh Report drew attention to "the age and mechanical unreliability of the special vehicles used for the road transport of nuclear weapons".[10] As long planned, the old Mammoth Major carriers have been replaced by eight new vehicles procured from Brown Root Vickers. All are now in service. MoD told us that—

> "despite some minor teething problems, the new vehicles represent a significant improvement in mechanical reliability over the older Mark I vehicle".[11]

[1] para 4.4.3.
[2] Evidence, p 27, A10b.
[3] Q1590.
[4] Qq 1600–1602.
[5] 4.4.5, 6.4.
[6] 6.4.
[7] Evidence, p 27, A10c.
[8] 4.5.3.
[9] Drell Report, page 28.
[10] 3.5.3.
[11] Evidence, p 28, A10f.

In oral evidence, MoD told us that, despite over 100,000 vehicle kilometres of trial running, there had already been two or three breakdowns, attributable to overheating brakes and an oil leak.[1] As MoD's Director Nuclear Policy and Security put it,"they should not be happening".[2] MoD recently demonstrated the resilience of the cargo element by dropping it onto concrete. It is evident that there are still a number of concerns, not least those expressed by a number of local authorities over arrangements for dealing with any emergencies arising from accidents during the movement of nuclear weapons. Warheads have to be moved around, not least for reasons of safety, so that the existing stock can be thoroughly checked and renovated. MoD are unwilling to declassify any information "which might assist in identifying the pattern or frequency of nuclear weapon convoys".[3] Both pattern and frequency are fairly well known to, and published by, interested pressure groups. **The maintenance of public confidence in the security and safety of transport of nuclear weapons requires the greatest possible degree of openness by MoD compatible with the overriding requirements of security.**

Oxburgh Report and beyond

17. We welcome the acceptance by the Government of the Oxburgh Report recommendations, many of which are concerned with the management of nuclear weapon safety issues within MoD. In particular, we look forward to the early appointment of the recommended nuclear weapon safety champion, to be responsible to the Chief Scientific Adviser, and the full establishment of the Safety Group under its already appointed Head.[4] We also note the warning in the Oxburgh Report of the potential significance of contractorisation of AWE, which will remain "the sole UK source of expertise and experience for warhead design, development and production". The Report recommended that the contractorisation of AWE should not be allowed to reduce the availability of nuclear expertise to MoD, and also warned that MoD would have to be "more than usually sophisticated in ensuring that AWE is appropriately tasked and adequately resourced".[5] We address these concerns below.

III. TESTS

18. In October 1992 the US Congress, at the end of the Energy and Water Development Appropriations Act 1993, imposed a moratorium on nuclear weapon testing until 1 July 1993, followed by a limitation to 15 tests over the subsequent three years. These tests are to be primarily concerned with the safety of nuclear warheads, with one annual test of reliability being permitted if certified by the President as vital to the national security interests of the United States. No underground testing may be conducted by the US after 30 September 1996 unless a foreign state conducts a nuclear test thereafter. The United Kingdom can conduct one annual test in the United States if the President determines that it is in the national interest of the US to do so. The UK did not in fact conduct any nuclear tests in 1992,[6] and for the purposes of the Trident programme does not need to do so.[7] Any further tests would presumably be of a newly developed warhead, that for the future theatre nuclear weapon (FTNW) referred to in the Oxburgh Report. The Report noted—

> "Weapon systems of this complexity and with the most demanding requirements for safety take a long time to design, test and produce, and to meet the intended in-service date, work on FTNW is underway now".[8]

19. There is a conflict between those who consider that sophisticated modelling renders nuclear tests unnecessary, even as an ultimate proof of safety, and those who believe that they are necessary to maintain total confidence in both safety and reliability. As Rear Admiral Irwin put it—

[1] Q1606.
[2] *ibid.*
[3] Evidence, p 34 , A18: *ibid*, p 35.
[4] Evidence, p 27, A10d; Qq 1594–5.
[5] 3.8.2; 3.8.4.
[6] Evidence, p 27, A8.
[7] Qq 1513, 1523, 1535.
[8] 2.1.4.

> "If you do not carry out a nuclear test it is possible to convince yourself you understand what you are doing when you do not"[1]

and Mr Witney, MoD's Director Nuclear Policy and Security—

> "It gives you the opportunity to touch reality, to relate the predictions of your theoretical calculations to empirical results..."[2]

The possibility of an outright test ban within a few years will no doubt serve to concentrate the minds of those analysing improved alternatives to testing.[3] Meanwhile, MoD does not seem unduly concerned about the forthcoming limitations, and is confident that the US will accept its proposals.[4] **If the UK is to mount nuclear tests over the next three years, we consider that the public in both countries is entitled to know, in outline if not in detail, what is being tested or validated, why, and with what results. To the extent that, as MoD told us, all tests have an element of safety in them,**[5] **such openness could only serve to assist public understanding and support. We therefore recommend publication, after the event, of the purpose and results of any future UK nuclear test.**

20. There is a significant financial as well as political cost to the testing in the United States of United Kingdom nuclear warheads. Each test is individually paid for:

> "included in the costs are payments covering arrangements for the management and disposal of radioactive wastes associated with the test, but none are made specifically in respect of environmental issues".[6]

For reasons which we are unable to understand, even the approximate costs of an underground test are classified.[7] MoD told us—

> "It remains the Government's view that to disclose financial information relating to the underground test programme, or any other aspect of the nuclear warhead programme, could risk revealing details of, for example, the direction our research and development programme is taking, or the level of nuclear capability of our forces. Such information could be useful to anyone constituting a potential threat to UK security interests."[8]

We can at this stage therefore only report to the House that the costs of a nuclear test are in our view significant.

IV. PROGRAMME ELEMENTS

Submarines

21. The latest estimate for the costs of the submarines, at 1992–93 prices, is £3,961 million, over £1,075 million below the 1981 estimate.[9] All but £194 million of that is to be spent in the UK, representing almost half of the estimated UK expenditure on the programme.[10] There has been practically no change since the 1992 estimate, although there has been a reduction in contingencies within the programme from £112 million to £84 million.[11] Over £2 billion, at hybrid prices, has been spent on the submarines, half of it on the more or less completed VANGUARD.[12]

22. VANGUARD, the first of class, completed "highly successful" contractor's sea trials from October 1992 to January 1993, which MoD told us had validated the integrity of the design of the class. The trials included a deep

[1] Q1521.
[2] Q1524.
[3] Q1524.
[4] Qq 1532–3: Evidence, p27, A10e.
[5] Q1517.
[6] Evidence, p 34, A16.
[7] *ibid.*
[8] Evidence, p 35.
[9] Evidence, p 23, A1b.
[10] *ibid.*
[11] Evidence, p 24, A3a.
[12] *ibid*, A3d.

dive.[1] Prior to VANGUARD's departure from Barrow-in-Furness, there was a problem arising over incomplete safety documentation on the reactor system: the matter was resolved to the complete satisfaction of the safety authorities and MoD.[2] Further work by VSEL at Barrow is now underway, and RN contract acceptance trials are due to begin in the second half of the year.[3] Although the programme has for some time been running at least four months behind the original schedule, some reprogramming of work will mean that VANGUARD's planned ISD "towards the end of 1994 or early in 1995" will be met.[4]

23. Construction of the three later submarines—VICTORIOUS (SSBN 06), VIGILANT (SSBN 07) and the as yet unnamed SSBN 08—is said to be proceeding well: being virtually identical to VANGUARD, problems can be expected to have been already largely ironed out.[5] VICTORIOUS will be rolled out of the Devonshire dock hall in late summer 1993. VIGILANT has all missile tubes installed. The contract for SSBN 08 was finally placed in July 1992, following a tender received in October 1991,[6] by which time £169 million—around 30 per cent of the contract value—had already been spent on long lead funding.[7] The same procedure was followed with VIGILANT. MoD told us that the SSBN 08 contract consolidated the achievements of the SSBN 07 negotiations, and has additional benefits, including subjecting of remaining areas of work to maximum price.

24. The timing of the contracts for SSBNs 07 and 08, and of their construction by VSEL, have been strongly influenced by non-military considerations, in particular by the state of contract negotiations and VSEL's long-term industrial requirements. In 1991, our predecessors discovered that long lead funding for SSBN 08 had been suspended as part of the negotiations over the contract for SSBN 07,[8] and that the programme for VICTORIOUS and VIGILANT had been deferred by six months to allow VSEL "a somewhat easier industrial loading profile".[9] In 1992, the Committee was told that different programme options were being considered for VIGILANT and SSBN 08 "in order to achieve the most cost effective and industrially sustainable construction programme while achieving our operational needs".[10] This year Rear Admiral Irwin told us—

> "We deliberately slipped SSBN 07 to give a better profile of work at Vickers and in doing so we arranged the programme for SSBN 08 to tie in with that, again to give the best programme of work at Vickers...".[11]

While we welcome MoD's understanding of VSEL's needs, and the overriding national requirement for the continuing viability of a nuclear submarine building facility, it is important that dates for the coming into service of the two later boats are fixed first according to military requirement, and only then adjusted to give the best profile of work at VSEL, and to provide work until construction of the Batch 2 Trafalgars is underway.

25. That SSBN 08 may, as has been foreshadowed for some time, not be available when VANGUARD goes in for her first refit, is not of itself too grave.[12] HMS REPULSE and HMS RESOLUTION, two very much older boats, have maintained an unbroken patrol pattern for some considerable time.[13] But delays in the entry into service of VIGILANT in turn delays the retirement of the last Polaris boat. Our predecessors noted in 1992 that their principal concern was "the ability of the older Resolution class submarines to maintain their proud record of uninterrupted patrols until they are fully replaced by the new submarines".[14] The Government has reiterated its confidence in the ability of the Polaris

[1] Evidence, p 26, A5b.
[2] *ibid*. For some problems arising during trials, see paras 29–30 below.
[3] *ibid*, A5b: Q1437.
[4] *ibid*, A5; Q1446. See 1992 Report, para 29.
[5] Qq 1439, 1449.
[6] Evidence, p 21, para 2: 1992 Report, para 31 and Evidence, p 27, A10.
[7] Evidence, p 26, A5c.
[8] 1991 Report, para 25.
[9] 1991 Report, Evidence, Q52.
[10] 1992 Report, para 32.
[11] Q1447: also Qq 1448, 1453–5.
[12] Q1450.
[13] Evidence, p 28, A11.
[14] 1992 Report, para 20.

force to maintain continuous deterrent patrols.[1] The last Resolution class submarine to be retired will probably be over 30 years old. **There is a degree of urgency in ensuring that VIGILANT comes into service as promptly as possible.**

Strategic Weapon Systems

26. The UK purchases its Trident D5 missiles from the US, through the US Strategic Systems Programme. Although specific missiles in the pool of such missiles held at King's Bay, Georgia, will not be identifiably British, the UK Government will take title to the missiles it purchases. The latest estimated cost of the missiles to the UK is £965 million, with an increase of £26 million in real costs over the past year. The Strategic Weapon System equipment, primarily purchased in the US, is to cost £1,140 million, with a small increase of £13 million in the estimated US spend.[2] Reductions in the total US purchase of missiles, or limits imposed by Congress on annual purchases, could drive up the cost to the UK of purchasing missiles. The proposed retrofit of the eight West Coast-based US Trident submarines to take D5 missiles has been postponed, and now looks increasingly unlikely ever to happen. MoD told our predecessors that this had resulted in additional costs to the UK of around £66 million, met by savings elsewhere and the use of contingency funds.[3] Recent strategic arms agreements between the US and Russia have already led to some calls in Congress for reducing the projected annual production rate of missiles.

27. The total UK missile requirement remains classified, for reasons which remain unclear to us.[4] In any event, **the 44 missiles which the UK has already purchased are enough for its immediate needs**—3 in FY 1990, 23 in FY 1991 and 18 in FY 1992.[5] Future purchases will be geared "almost entirely to the best commercial market": in other words, the UK will buy when they are cheapest.[6] MoD do not anticipate any "significant" increase in estimated expenditure as a result of abandonment of the backfit programme, having covered eventualities in the estimate.[7] Nonetheless, we note that there has been a further fall in the allocated contingency fund for the missiles[8] and net additional costs of £26 million, beyond the £24 million added in 1992.[9] The estimated missile production costs have in fact risen by £46.4 million, and missile assembly costs at Kings Bay have risen by £10.3 million, offset by a reduction in missile guidance quantities and costs and the use of contingency funds.[10] MoD made it clear that, if there were to be more fundamental changes in the US than are at present contemplated, there might indeed be substantial additional costs.[11] **We note that there have already been substantial increases in the estimated costs of purchasing missiles; we suspect that these may prove not to be the last such increases.**

Tactical Weapon System

28. In 1992 the Committee concluded that the tactical weapon system programme remained "a principal area of concern both technically and financially".[12] Those concerns are principally the sonar suite and the submarine command system (SMCS), and the integration of all the systems, as set out in previous Reports.[13] The past year has seen an increase in the costs of the programme of £21 million, and the exhaustion of all the contingency funds originally allocated to it.[14] The Secretary of State's Report stated that the development of the Tactical Weapon System continued to make "steady

[1] 1992 Reply, para 8.
[2] Evidence, p 24, A3a.
[3] 1992 Report, para 37.
[4] 1992 Report, para 38: 1992 Reply, para 14: Qq 1464ff.
[5] Evidence, p 27, A7a: 1992 Report, para 38:.
[6] Q1473.
[7] Q 1460.
[8] Evidence, p 25, A3e.
[9] 1992 Report, para 37.
[10] Evidence, p 34, A14.
[11] Q1472.
[12] 1992 Report, para 44.
[13] *ibid*, paras 40–44: 1991 Report, paras 39–41: 1990 Report, paras 30–33 &c.
[14] Evidence, p 24–5, A3a and A3e.

progress", and that the production programme remained on schedule.[1] MoD confirmed that "good progress has been made in resolving outstanding problems with the Tactical Weapon System over the last year".[2] Rear Admiral Irwin told us that—

> "Although the Tactical Weapon System performed satisfactorily during contractor sea trials, there are some technical difficulties still to be resolved and the programme contains little contingency".[3]

There is now little or no lead time between completion of testing of equipment in the Shore Development Facility and the start of equivalent testing in VANGUARD, and for some elements indeed an overlap.[4]

29. The Sonar 2054 programme has throughout been subject to a number of relatively minor problems and snags, causing substantial delay and inconvenience;[5] but there has been no further slippage in the past year.[6] Both equipments and software were successfully tested in contractor's sea trials, and the development and testing of subsequent issues of software is progressing.[7] But these trials were seriously hindered by the loss of the towed array at an early stage, probably due to human error in assembly on shore.[8] This misfortune meant that it was not possible to trial the integration of the towed array with the rest of the sonar suite.

30. Contractor's sea trials also revealed difficulties with the electronic systems within the Self Protection Mast periscopes, and a detailed review of these deficiencies is underway "to establish an appropriate and cost effective solution".[9] Rear Admiral Irwin believed that there were solutions for these unreliability problems, and emphasised that there were no implications for safety of navigation.[10] MoD have subsequently told us that "a large proportion of the problems identified during VANGUARD's contractors' sea trials have now been rectified... it is expected that system reliability will be satisfactory when VANGUARD is accepted later this year"[11]. **We note MoD's assurances on aspects of the performance of the electronic systems within VANGUARD's periscopes.**

31. In order to keep to the already compressed timetable for operational deployment, VANGUARD was obliged to undertake contractor's sea trials without a fully functional command system, as a result of long-running problems with the SMCS software. When it was decided in August 1986 to embark upon a new command system, it was apparently recognised that it might not be possible to achieve full capability in time for VANGUARD's first deployment.[12] It is still planned that it should do so. The programme for successive issues of SMCS software remains on schedule, although the programme is tight.[13] Rear Admiral Irwin expressed himself as reasonably confident that the programme would meet the dates required.[14] The principal missing element at present is the ability to fire torpedoes; by the time that VANGUARD's torpedo trials are scheduled, the relevant software should be available.[15] We are relieved by the assurances of both Rear Admiral Irwin and his predecessor that there will be no repetition of the Type 23 frigate command system problem, and that the lessons of problems over the command system are being learned.[16]

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[1] Evidence, p 21, para 4.
[2] *ibid*, p 26, A6.
[3] Q1437: also Q1506.
[4] Evidence, p 26, A6c: Q1506.
[5] Qq 1477, 1506 and 1992 Report, para 42.
[6] Evidence, p 26, A6d.
[7] *ibid*, A6a.
[8] Qq 1477–9, 1485, 1492.
[9] Evidence, p 26, A6e.
[10] Q1494.
[11] Evidence, p 34, A15.
[12] 1992 Report, Evidence, Q2111.
[13] Evidence, p 26, A6a.
[14] Qq 1498–1504.
[15] Q1500.
[16] Q1512.

Works

32. In past years, the Committee has examined in some detail various aspects of the vast shore construction programme associated with the Trident programme, particularly at Faslane and Coulport in Scotland. Recently, the Committee scrutinised problems with the shiplift, and the cancellation of the proposed magnetic treatment facility.[1] We have not embarked on a detailed analysis this year, in view of the expressed intention of the National Audit Office to study the Trident works programme.

33. The latest overall cost estimate, including dockyard projects and functional machinery, is £1,380 million, involving an increase of £25 million and a fall in the allocated contingency of £23 million.[2] MoD reports however that good progress has been made over the past year, and remains "confident that the works programme will meet the requirements of Trident".[3] The huge explosives handling jetty was towed to Coulport in April 1992 and has been handed over. The shiplift is due to be completed in summer 1993. At Rosyth, the RD46 emergency docking facility, costing around £25 million, was handed over in November 1992. Work has continued on the RD57 Refuelling and Refitting facility pending an announcement on the venue for the future refit of nuclear submarines: over £100 million has been spent to date.[4] RD57 was originally designed to refit Vanguard class SSBNs and SSNs in two adjacent docks, with a virtually continuous SSN refit stream. As a result of "more recent detailed studies", and the reduction in the size of the nuclear submarine force, MoD told us that more cost effective options have been identified.[5] While we understand how the reduction in the size of the submarine force reduces the total nuclear refit requirement, it is less clear how such major changes have been judged possible to the overall design and construction concept. The possibility exists that the original design was over-elaborate: or that corners are now being cut. **Wherever Trident submarines are in the event to be refitted, there will be substantial capital expenditure, and a continuing requirement for tight supervision by MoD. We will be examining these matters further once Ministers have announced their proposals for the future pattern of naval refit work.**

V. AWE

34. The warhead for Trident is designed and manufactured by the Atomic Weapons Establishment (AWE). In past reports, the Committee has drawn attention to manpower, management, and works problems at AWE Aldermaston, and to some degree at other AWE sites, and has stressed the need to maintain close scrutiny of all AWE matters. Following the announcement in December 1989 of interim contractorisation of AWE, the Committee reported in some detail in 1990 on the new situation.[6] The Hunting-BRAE consortium won the initial two-year contract. In February 1993 it was announced that they had won the full contract to run from April 1 1993 until the year 2000.[7] Eighteen months before the end of that period, there will be a formal review by the MoD as to whether to extend or terminate the contract, or to recompete it. MoD are bound to conduct less formal reviews at least once every six months.[8] As part of its own scrutiny of AWE matters, the Committee visited the Establishment at Aldermaston at the end of April where it met with management and Trades Union representatives. We are grateful to the management at AWE Aldermaston for making the visit both helpful and instructive.

Manpower, Pay and Conditions

35. AWE Aldermaston, and to some extent its sister facility at Burghfield, has had a long history of difficulties in connection with the recruitment and retention

[1] Evidence, p 29, A12d: 1992 Reply, paras 17–20.
[2] Evidence, p 24, A1b, A3a &c.
[3] Evidence, p 21, para 6, and p 28, A12c: Q1437.
[4] Qq 1610–1613: Evidence, p 28, A12c.
[5] Evidence, p 35, A19.
[6] HC 237 of Session 1989–90, Part V.
[7] HC Deb, 4 February 1993, col 265*w*.
[8] Qq 1621–2.

of staff.[1] Such problems have in the past been attributed primarily to the level of pay at the Establishment, which had been lower than that awarded to comparable workforces elsewhere in the Thames Valley Area.[2] In 1990, it was pointed out by AWE Trades Unions in a memorandum to the Committee that AWE pay for a skilled worker was up to 25% less than could be expected elsewhere in the region.[3] Despite the provision of MoD accommodation for some 1,000 staff, the scarcity of inexpensive housing in the area was cited as a further difficulty in recruitment.[4]

36. SPAs (Special Pay Additions) were first introduced in 1985, and revised most recently in October 1989, in an attempt to counter the effects of low pay.[5] However, they only had limited impact and caused resentment as the basis for their allocation appeared arbitrary and therefore unfair.[6] The turnover of staff—averaging over 600 persons yearly—has also been a serious problem, a combination of low pay, expensive housing, a bulge in the upper reaches of the staff age profile and other factors.[7] In 1988, when extra staff were having to be recruited in expectation of the commissioning of the new facilities, A90 and A91, MoD told the Committee that they were having "to run very fast to keep standing still".[8] As recently as 1991, the Committee stated that "the manpower situation still gives cause for concern."[9]

37. When Hunting-BRAE received the interim contract for AWE Aldermaston in 1990, the contract stipulated that the consortium "advise MoD on the appropriate pay and conditions necessary to recruit and retain an efficient and effective work-force".[10] The resulting study, which recommended a small increase in the level of pay at Aldermaston, was put before the Treasury in 1992.[11] The proposals were however "put on ice because by the time this consideration was made it was getting close to the full contractorisation of Aldermaston".[12] No increases were subsequently made. In February 1993, MoD told the Committee that pay and conditions were "not a factor... preventing sufficient recruitment to man the programme".[13] More recently, Hunting-BRAE have indicated that they intend to introduce "pay and conditions changes aimed at rewarding performance and output and removing restrictive practices". Pay restraints upon the public sector will not apply directly to AWE.[14]

38. The manpower situation appears at first sight better than it has been over recent years. Turnover of staff has fallen from the rate of 13.5% for the year ending December 1990 to 9.5% for the year ending December 1992.[15] There are still 100 posts to be filled in the, primarily electronic, specialist field where recruitment is particularly difficult due to a national shortage of suitable applicants.[16] Many of those specialist posts represent the extra requirements of research on the successor to the WE177 free-fall bomb.[17] In most other categories, vacancies are at their lowest levels for several years. The economic climate over the last few years may well have influenced the present greater stability of the Aldermaston workforce.[18] **It will be necessary to keep the manpower situation under careful review once the economy revives and the possibility of alternative employment increases.**

[1] HC 374 of Session 1988–9, para 95; HC 237 of Session 1989–90, paras 53–7; HC 286 of Session 1990–1, paras 65–9.
[2] HC 237 of Session 1989–90, para 54.
[3] HC 237 of Session 1989–90, Appendix 12, pp. 77–9.
[4] HC 374 of Session 1988–9, para 100.
[5] HC 374 of Session 1988–9, para 91; HC 237 of Session 1989–90, para 55.
[6] HC 237 of Session 1989–90, para 55.
[7] HC 422 of Session 1987–8, paras 80–1; Q1614.
[8] HC 189–1 of Session 1987–8, Qq 666, 682 and 699; HC 374 of Session 1988–9, para 92.
[9] HC 286 of Session 1990–1, para 67.
[10] HC 237 of Session 1989–90, Appendix 15, 11e.
[11] HC 337 of Session 1991–2, qq 2222–3.
[12] Q1615.
[13] *ibid.*
[14] Evidence, p 37, A1.
[15] Evidence p 37, A2.
[16] Evidence, p 29, A13.
[17] HC 286 of Session 1990–1, q156.
[18] HC 337 of Session 1991–2, q2221.

39. Another reason for the improvement to Aldermaston's manpower situation lies in a "re-assessment of the number of vacancies" at the Establishment carried out by Hunting-BRAE referred to by the Deputy Controller (Nuclear) at AWE when he gave evidence before our predecessor Committee in 1991.[1] During the Committee's visit to Aldermaston in April 1993, we were assured by the Compliance Director that he had examined the proposals to ensure that safety would not be adversely affected and that he had given his approval. **As resource management plays a part in the eligibility of the contractor for incentive fees,[2] and in the light of possible future deterioration at Aldermaston in the recruitment and retention of staff, the Compliance Office holds a vital place in maintaining safety levels in the face of any changing manpower situation, and we look to it to pay particular attention to manpower levels.**

40. On one matter of conditions, while in itself minor, the Trades Unions have expressed their disquiet that Hunting-BRAE have not entered into negotiations over the availability of paid leave for members of staff wishing to participate in MoD sporting events.[3] MoD have expressed their understanding that Hunting-BRAE have no plans to grant paid sports leave for MoD events.[4]

Redundancy

41. During the passage of the AWE Bill through Parliament in 1991, ministerial assurances were given that "employees transferred from the Civil Service to AWE plc... will, in the event of redundancy, receive benefits of at least equivalent value to those they would have received under Civil Service terms applicable immediately prior to [contractorisation]".[5] Concern has been expressed, however, that in certain cases the redundant employee is being offered terms which are less—and often significantly less—than the Civil Service equivalent.[6] This has been recognised by MoD, and we have been assured that appropriate steps are to be taken to "ensure that payments... will be as good as those that would have been paid in the Civil Service".[7]

Works

42. In terms of the production of warheads for Trident, the most critical part of the Aldermaston works programme concerns the new Centre Site facilities which consist primarily of A90, the plutonium pit processing plant, and A91, the radioactive liquid effluent treatment plant. The original handover date for A90 was 1986, but this was delayed to 1988 after the Government opted for the D5 rather than the C4 version of Trident.[8] Further delays set in when problems were discovered with the ductwork in parts of the facility.[9] White commissioning[10] finally began in 1990 and was still in progress in April 1993.[11] Red commissioning[12] is due to begin later in the year and to take several months.[13] Once A90 is in full production it will take nine months for fissile material to be turned into a plutonium pit ready for assembly.[14]

43. These delays have meant that the Trident warhead programme has thus far had to rely upon the older and smaller facilities, A1.1 and A45. This reliance had to some degree been expected for the first outload and has not entailed significant cost.[15] However, as the Committee noted in their 1989 Trident Report, these facilities "cannot meet the total warhead requirement" for

[1] HC 186 of Session 1990–1, q155.
[2] HC 237 of Session 1989–90, appendix 15, 14a and 14c.
[3] Evidence, p 37, 2.6.
[4] Evidence, p 38, A6.
[5] Evidence, p 38, A5.
[6] Evidence, p 36–7, 2.5.
[7] Evidence, p 38, A5.
[8] HC 374 of Session 1988–9, para 72.
[9] HC 374 of Session 1988–9, paras 79–84.
[10] White commissioning is the process of proving that new plant and facilities operate safely and satisfactorily using similar but non radioactive materials.
[11] HC Deb, 2 April 1993, col 503*w*.
[12] Red commissioning is the process of proving that the new plant and facilities operate safely and satisfactorily using limited amounts of actual radioactive materials.
[13] HC Deb, 2 April 1993, col 503*w*.
[14] HC 374 of Session 1988–9, para 73.
[15] Evidence, p 38, A7.

subsequent outloads.[1] MoD witnesses acknowledged that the A90 facility is necessary "if we are to meet our requirements for the Trident programme in full".[2] **The delays to the A90 building are inexcusable given the importance of the Trident programme, and the building must be brought into full production use at the earliest possible time. There is now no real contingency for further delays to the programme of works at Aldermaston.**[3]

44. Delays have also set back the commissioning of A91, the liquid effluent treatment plant constructed to serve A90. White commissioning began but was halted in March 1991 due to leaking pipework and filter vessels. Only a small part of the facility was affected, although the localized corrosion was severe.[4] Although A90 can operate without A91, by using the older A12, waste management complex, facilities, this is obviously far from ideal. The project definition study to evaluate the works necessary to overcome these problems reported at the end of March.[5] A timetable for repairs to the facility is to follow.[6] The delay is obviously creating extra expense for the programme. Perhaps more seriously this delay places a further burden on the ageing A12 facilities which Pochin in 1978 recommended be replaced "as soon as practicable".[7] As no other companies are competing with Hunting-BRAE for MoD nuclear project contracts, such delays are particularly onerous.[8] It must also be noted that no decision has yet been taken over replacements to the solid waste and contaminated equipment treatment facilities at the site,[9] although the Pochin Report in 1978 stated that "in the long term it would seem essential to relocate the difficult processes in buildings designed from the start."[10] **It is vital that the Compliance Office carefully monitor the safety of these old facilities, and that decisions are taken as quickly as possible upon their necessary replacements. We will look to the MoD to report to us on plans for the decommissioning of those facilities, and the subsequent storage or disposal of contaminated material.**

Research

45. Research, especially in the fields of safety[11] and of planning the successor to the WE177 free-fall bomb,[12] is integral to operations at Aldermaston, formerly the Atomic Weapons Research Establishment. Concerns were expressed by our predecessors following the announcement of plans to contractorise AWE Aldermaston that provisions in the Government Owned/Contractor Operated (GO-CO) contract would not "adequately safeguard MoD's nuclear research interests".[13] There were uncertainties as to how research would be commissioned, upon what basis it would be financed, and how, in an establishment troubled by manpower shortages as it was then, and given a fixed manpower budget, research could not but be sacrificed to production programmes.[14] A Research Management Plan was introduced to bridge "the gap between broad assumptions and detailed plans" and to provide "detailed, costed and resourced plans for the research programme over the next few years".[15] This is intended to ensure that the Establishment will be able to mount a more coherent research programme based upon a number of distinct project contracts—the successor to WE177 being just one—granted by different departments within MoD and supervised by the Compliance Directorate.[16] **This greater supervision of the research plan is welcomed by the Committee.**

[1] HC 374 of Session 1988–9, paras 87–8.
[2] *ibid*.
[3] HC Deb, 2 April 1993, col 502*w*.
[4] HC 337 of Session 1991–2, Evidence p. 33 (A32).
[5] HC Deb, 4 March 1993, col 226–7*w*.
[6] HC Deb, 13 May 1993, col 570*w*.
[7] E. Pochin, "Report of an Investigation into Radiological Health and Safety at the Ministry of Defence (Procurement Executive) Atomic Weapons Research Establishment, Aldermaston", Harwell, Oxfordshire, 30 October 1978, p 18, para 86.
[8] Evidence, p 38, A3.
[9] Evidence, p 38, A8.
[10] *ibid* p 22, para 110.
[11] Evidence, p 29, A14a.
[12] HC 286 of Session 1990–1, q156.
[13] HC 237 of Session 1989–90, paras 75–6.
[14] *ibid*.
[15] HC 337 of Session 1991–2, qq 2226.
[16] Evidence, p 30, A15a.

46. Concern has also been expressed—not least in the Oxburgh Report[1]—that any new arrangements at AWE Aldermaston must not reduce the availability of nuclear expertise to MoD. The Term Contract drawn up for full contractorisation thus contains "provisions for both the training of MoD staff at AWE and for the secondment, under standard MoD arrangements, of selected staff, both to and from AWE, to ensure that the present position is not weakened".[2] With the exception of certain staff shortages referred to above, the research programme seems to be adequately directed and resourced. Under the terms of the 1958 agreement, the UK must conduct high quality, innovative research in warhead design and technology, and make significant progress, in order to participate at all in the exchange of nuclear information with the USA.[3] **It is vital, given the unique facilities available at AWE Aldermaston, and the expertise of the work-force there, that a steady and well-resourced research programme be maintained, taking full advantage of Aldermaston's unrivalled potential to the benefit of both ourselves and our American research partners.**

Security

47. Security has continued to be a high priority since contractorisation.[4] During the move towards contractorisation, some concern had been expressed at the implications for security of a GO-CO operation.[5] The Committee was then assured that responsibility for the physical security of AWE would remain with the Ministry of Defence and would be paid for directly by the MoD.[6] Just prior to full contractorisation, MoD gave evidence to the Committee that "the security organisation and arrangements inherited by Hunting-BRAE have remained unchanged".[7] Although a number of security projects are being undertaken by Hunting-BRAE,[8] and some additional MDP manpower is required, security arrangements will remain as they are:[9] the consortium is bound, contractually, to maintain security at present levels.[10] Vetting for all staff is being carried out as it was before contractorisation.[11] Nevertheless, we must point to the distinction between the assurance that responsibility for security would remain with MoD, and the fact that the security organisation and arrangements have in fact been "inherited" by the contractor. **Security is paramount, and there is no room at Aldermaston for complacency in this matter.**

Safety

48. In response to concerns expressed about the priority of safety following contractorisation, MoD assured the Committee that "safety has the highest priority of all activities at AWE and, as such, cuts across all programme boundaries. From the start of the management contract, safety requirements will be strictly laid down and the Compliance Office will have the necessary authority to ensure that standards are met".[12] Such assurances were re-iterated during the visit of the Committee to Aldermaston in April 1993. MoD also reported to the Committee in February 1993 that in line with the recommendations of the Oxburgh Report[13] provision was"being made to give current job holders [at key administrative posts] and incumbents suitable training [in nuclear safety matters] at AWE, by the Services, or by attendance at relevant courses".[14] The radiation exposure limits set by AWE are lower than those set by MoD which in turn are lower than those required by law. The Director Safety remains a member of the AWE Executive Board, and Hunting-BRAE have introduced a new managerial

[1] Oxburgh, "The Safety of UK Nuclear Weapons", p 5, recommendation 12.
[2] Evidence, p 29, A14b(ii).
[3] HC 237 of Session 1989–90, Appendix 4, p 52, A9.
[4] HC 337 of Session 1991–2, Appendix 2, p 34, A33e.
[5] HC 237 of Session 1989–90, Appendix 11, p 73, no. 3.1(ii).
[6] HC 237 of Session 1989–90, para 72.
[7] HC 337 of Session 1991–2, Appendix 2, p 34, A33e.
[8] *ibid.*
[9] Evidence, p 38, A10.
[10] Qq 1623–4.
[11] Evidence, p 39, A11.
[12] HC 237 of Session 1989–90, Appendix 4, p 52 A86.
[13] Oxburgh, "The Safety of UK Nuclear Weapons", p 4, recommendation 5; also *ibid* para 3.2.5.
[14] Evidence, p 29, A14b(i).

position charged with reviewing safety performance and proposing future developments.[1]

49. Concerns remain, however, very much in the public eye. The necessary confidentiality of much of what goes on at AWE Aldermaston is seen as excessive by several pressure groups[2] and by members of the public. Indeed, one unfortunate outcome of this confidentiality is that what few facts are generally available are open to differing interpretations, which in turn can increase public unease. Much of this unease appears to stem from what is perceived as excessive secrecy and from the lack of any independent inquiry into the safety of operations since that undertaken by Pochin and Sidney Smith in 1978.[3] That this unease may in certain respects be justified is suggested by the fact that, although no major incident of such gravity as that which occasioned the Pochin Report has since occurred[4], there have been several serious incidents at the Establishment over the past 15 years, most recently involving the release of a small amount of radioactive material from a damaged container within a storage building on 8 December 1992.[5]

50. In the light of technological developments and the operation of new facilities and new procedures since 1978, there is some unease also amongst staff that their past reliance in day to day matters upon Pochin is seen as increasingly irrelevant by line management.[6] Such unease on behalf of both staff and sections of the public could best be assuaged by an independent assessment of safety levels at Aldermaston. This might not only ease the fears of those concerned but also help to encourage even greater safety consciousness at the Establishment. **The Health and Safety Executive (HSE) is engaged in a review of safety procedures and emergency arrangements at AWE. The Committee welcomes this review. In our view it is essential that an independent assessment be made of safety levels at Aldermaston, and we consider it important that a report upon its findings be made public as a guide to staff and for the information of the public. The publication of the HSE's findings could go some way towards providing this.**

The Compliance Office

51. The Compliance Office was established in 1992 to assess and monitor the management contractor in the interim phase of contractorisation. This assessment was measured against audit, health and safety, quality assurance, and other performance measurement criteria.[7] During this period of interim contractorisation, the Compliance Director was able to develop and assess means of maintaining MoD scrutiny over the management of AWE—compliance methodology as it has become known—once full contractorisation was in place.[8] As has been noted with regard to manpower, the function of the Compliance Office in maintaining levels of security, safety, and production quality is vital to the effective and safe running of the Establishment.

52. Concern had been expressed in the past over the manning strength of the Compliance Office which appeared insufficient to take on the many important duties to which it has to attend.[9] In the 1991 Report on Trident, our predecessor Committee stressed that "the human and financial resources devoted to the Compliance Directorate must be fully commensurate with the scale of its task".[10] In the months leading up to April 1994, it would appear that extra personnel are to be taken on by the Office.

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[1] HC 337 of Session 1991–2, Appendix 2, p 34. A33d.
[2] For example, Greenpeace's "Aldermaston: Inside The Citadel".
[3] E. Pochin, "Report of an Investigation into Radiological Health and Safety at the Ministry of Defence (Procurement Executive) Atomic Weapons Research Establishment, Aldermaston", Harwell, Oxfordshire, 30 October 1978; Annex H of the report, a "Report on Certain Health and Safety Topics at AWRE", was written by Mr Sidney Smith of the HSE.
[4] In 1978, plutonium operations at Aldermaston came to a halt after up to 15 workers were found to have lung burdens of plutonium at or above the maximum permissible limit.
[5] HC Deb, 17 December 1992, Col 359*w*.
[6] Evidence, p 36, 2.3.1(a).
[7] HC 237 of Session 1989–90, Appendix 15, p 87, no.14.
[8] Qq 1619–20.
[9] HC 286 of Session 1990–1, para 70.
[10] *ibid*.

53. **It is a matter of the utmost importance that AWE employees have ready and direct access to the Compliance Office.** Unless criteria are in place by which to judge which matters deserve the attention of the Office, it is possible for staff to be discouraged from resorting to the Compliance Office at all. Indeed, we were disturbed to learn from Trades Union representatives at AWE that staff did not believe that they could gain direct access to the Compliance Office.[1] Although we have been assured that the right of all groups and individuals to raise issues with the Compliance Office has recently been reiterated in a site notice at AWE,[2] there still appears to be sufficient confusion and dispute over this access to require further serious attention on the part of Hunting-BRAE. Moreover, the independence of the Office must be clearly maintained. It is also essential that staff should know how and under what circumstances they can bring matters to the attention of the Compliance Office. While many matters should be addressed in the first instance through line management, the openness of the Compliance Office also has an important psychological bearing upon the safety behaviour of staff and management. This openness must work both ways: staff at Aldermaston need to be aware of the accessibility of the Compliance Office as well as of their openness to its scrutiny. We are aware that those who work at Aldermaston often feel that they are unable to raise justifiable health and safety concerns with the appropriate authority and that they may be putting their jobs at risk when they do so. **The unusual nature of the Government Owned/Contractor Operated scheme, and the potential dangers of work at Aldermaston, makes it essential that employees are able to raise health and safety matters without fear of stricture.**

Conclusion

54. While recognising that this GO-CO operation is still in its infancy, we remain cautious about the rate of progress at Aldermaston since contractorisation. There are still difficulties over the works programme and it is too early to claim definite progress on the manpower front. The Trades Unions at AWE have expressed concern over certain issues raised above, many of which still appear to require some resolution.[3] **Against this background, and in view of current difficulties, we intend to undertake a closer and more frequent scrutiny of AWE than hitherto.**

[1] Evidence, p 36, 2.3.2.
[2] Evidence, p 38, A9.
[3] Other matters, such as the payment of VAT on contracts, appear to have been satisfactorily explained by MoD. Evidence, p 36, 2.4; p 38, A4.

LIST OF ABBREVIATIONS

ABM	Anti-Ballistic Missile
AWE	Atomic Weapons Establishment
ENDS	Enhanced Nuclear Detonation Safety
FTNW	Future Theatre Nuclear Weapon
FRP	Fire Resistant Pits
GO-CO	Government owned, contractor operated
HE	High Explosive
HSE	Health and Safety Executive
IHE	Insensitive High Explosive
ISD	In-service date
MDP	Ministry of Defence Police
MoD	Ministry of Defence
SMCS	Submarine Command System
SPA	Special Pay Addition
SSBN	Nuclear-powered Submarine armed with ballistic nuclear missiles
SSN	Nuclear-powered (hunter-killer) submarine
SWS	Strategic weapon system
UK	United Kingdom
US	United States
VSEL	Vickers Shipbuilding and Engineering Limited

PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT

WEDNESDAY 16 JUNE 1993

Members present:
Sir Nicholas Bonsor, in the Chair

Mr Menzies Campbell	Mr Bruce George
Mr Churchill	Mr John Home Robertson
Mr Michael Colvin	Mr John McWilliam
Mr Frank Cook	Mr Peter Viggers

The Committee deliberated.

Draft Report (The Progress of the Trident Programme), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 54 read and agreed to.

Resolved, That the Report be the Sixth Report of the Committee to the House.

Ordered, That the provisions of Standing Order No. 116 (Select committees (reports)) be applied to the Report.

Ordered, That the Chairman do make the Report to the House.

[Adjourned till Wednesday 30 June at half past Ten o'clock.]

LIST OF WITNESSES

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Wednesday 10 March 1993

REAR ADMIRAL RICHARD IRWIN, Chief Strategic Systems Executive, DR JOHN CATCHPOLE, Director General Strategic Weapon Systems, MR GEOFFREY BEAVEN, Deputy Controller (Nuclear), MR JOHN COLSON, Director (Finance and Secretariat) Strategic Systems and MR NICK WITNEY, Director Nuclear Policy and Security, of the Ministry of Defence, were examined 1

LIST OF WRITTEN EVIDENCE

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1.	Letter to the Chairman from the Private Secretary to the Secretary of State for Defence on the revised Trident estimate, together with a memorandum submitted by the Ministry of Defence on the Trident programme (21 January 1993)	21
2.	Memorandum submitted by the Ministry of Defence on Trident (8 February 1993)	23
3.	Extract from "The Safety of UK Nuclear Weapons"—Report of the review conducted by a working group led by the MoD's Chief Scientific Adviser (July 1992)	30
4.	Extract from a letter to the Clerk of the Committee from the Private Secretary to the Secretary of State for Defence on reportable accidents and incidents at AWE Burghfield (14 April 1993)	33
5.	Memorandum submitted by the Ministry of Defence on the Trident programme, following the Oral Evidence taken on 10 March 1993 (21 April 1993)	34
6.	Letter to the Clerk of the Committee from the Private Secretary to the Secretary of State for Defence on the costs of underground nuclear tests and the frequency of nuclear convoys (7 March 1993)	35
7.	Memorandum submitted by the AWE Trades Unions (26 May 1993)	35
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MINUTES OF EVIDENCE

TAKEN BEFORE THE DEFENCE COMMITTEE

WEDNESDAY 10 MARCH 1993

Members present:

Sir Nicholas Bonsor, in the Chair

Mr Menzies Campbell	Sir Nicholas Fairbairn
Mr Winston Churchill	Mr Bruce George
Mr Michael Colvin	Mr John Home Robertson
Mr Frank Cook	Mr John McWilliam

Examination of Witnesses

REAR ADMIRAL RICHARD IRWIN, Chief Strategic Systems Executive, DR JOHN CATCHPOLE, Director General Strategic Weapon Systems, MR GEOFFREY BEAVEN, Deputy Controller (Nuclear), MR JOHN COLSTON, Director (Finance and Secretariat) Strategic Systems and MR NICK WITNEY, Director Nuclear Policy and Security, Ministry of Defence, examined.

Chairman

1437. Good morning, Admiral. I think this is the first time you have come to this Select Committee. Could I welcome you: I think your predecessor, Admiral Pirnie, appeared in front of this Committee for many years, and I hope you will be with us for a long time. Could you start by giving an overall view of the progress of the Trident programme and the principal remaining areas of concern?

(Rear Admiral Irwin) Certainly, Chairman. The programme continues to make steady progress and remains on schedule and within budget. This has been a particularly significant year for the programme with VANGUARD undergoing Contractors Sea Trials from last October to January this year. I am pleased to report that these trials were highly successful with all major equipments and systems performing well. VANGUARD is now back with the shipbuilder for a further period of work prior to being accepted into the Royal Navy later this year. I can confirm that there has been no slippage in VANGUARD's planned in service date, and that construction of the other three boats is also progressing well and to schedule. It would be misleading, and indeed remarkable in a project of this scale and complexity, to report that there were no concerns or difficulties. Although the tactical weapon system performed satisfactorily during contractor's sea trials, there are some technical difficulties still to be resolved and the programme contains little contingency. I am, however, confident that Trident requirements will be met. Delays to Trident related works projects have been an area of concern in the past, although I am pleased to say that over the past year we have made good progress in solving technical and contract management difficulties. All major facilities have now been handed over with the exception of the explosives handling jetty at Coulport, due to be handed over in two weeks' time, and the shiplift at Faslane, scheduled for completion during the summer. I also believe it is worth recording that there has again been a small real reduction in the cost of the Trident programme, and that the total project estimate represents a real cost saving of £2.8 billion against the original estimate.

1438. Thank you. Can I take it from what you say that the main difficulties which may have been encountered earlier are resolved?

(Rear Admiral Irwin) Yes, Chairman.

1439. And has anything been done as a result of what you have found out so far to alter the planning for the future submarines? In other words, are numbers two and three going to be exactly the same as VANGUARD, or are there going to be modifications?

(Rear Admiral Irwin) The principle is that they should be exactly the same. In practice, there may be tiny modifications, but they should not be noticeable.

1440. In response to our written questions you have given estimated Trident operating costs over its lifetime as £5.5 billion. Can you give a break down of those costs in main categories?

(Rear Admiral Irwin) In a moment I will ask Mr Colston to go into more detail, but can I start by saying that there have been very much larger figures bandied around in the press, and I have reasonable faith in the figures that we have put together, because we are looking ahead for a long time. Of course we cannot get it exactly right, but we have reasonable faith that they are right, and that they are comprehensive, covering refit costs and decommissioning costs.

(Mr Colston) Chairman, we have in our written answer to your question indicated that our estimate of £5.5 billion for the operating costs of the Trident force is an approximate figure. As Admiral Irwin has indicated, seeking to forecast the precise costs over a period of some thirty years is not possible, but we do believe that the estimate we have offered to the Committee is robust and comprehensive. You asked for a breakdown of those costs: I will, if I may, offer a breakdown in general terms, because the estimate does contain an element for the operating costs of the Atomic Weapons Establishment, which we would not normally isolate separately. In general terms, the figure includes some £1 billion for the manpower and related costs of the crews of the submarines and associated civilian staff: this includes pay, allowances, accommodation, travel

[**Chairman** *contd*]
and subsistence. It includes some £1.35 billion representing the costs of the refits of the submarines over the lifetime of the force. It contains some £1 billion for the costs of stores and stores personnel and the transport of stores throughout the life of the force. It contains some £1.2 billion representing a share of the running costs of the Clyde Submarine Base at Faslane. It contains about £150 million representing the comprehensive costs of the decommissioning and eventual disposal of the four Trident submarines, and roughly a billion pounds covering the intramural and extramural running costs at the Atomic Weapons Establishment, and the in- service support of the strategic weapons system and the submarine.

1441. Thank you. Have the submarine and the PWR2 reactor design changes meant any change in the cost or length or frequency of refits?
(Mr Colston) There is a change in the assumption of the number of refits which will be undertaken with Trident by comparison with Polaris. The original intention with Polaris was that twelve refits would be conducted: for the Vanguard class the assumption is that there will be eight refits conducted.

1442. And as far as the Polaris is concerned, our estimated refits have not actually turned out to be the case. I think substantially more refitting is necessary than planned, is that right?
(Rear Admiral Irwin) We have run the Polaris submarines very much longer than we had planned between refits, so when the refits have come up they have been longer than originally intended.

1443. Right. REVENGE I think went in April 1992 and RENOWN has been held in refit for much longer than planned for reasons you have outlined. That means, I think, you have only had two boats—REPULSE and RESOLUTION—actually available. Can you comment on the need for three or four submarines and whether you have been able to cope adequately with the two you have been running recently?
(Rear Admiral Irwin) Yes. Experience of operating the Polaris force over the last twenty or so years has convinced us of the need for a four boat deterrent force in order to ensure that one boat is always on patrol. There have certainly been times when breaks in continuous deterrent patrols would have occurred if we had only had a three boat force. Even with four boats it has been impossible to avoid periods such as now when only two boats are available for operational patrol. During such periods we obviously run a greater risk of an unforeseen incident or problem causing a break in patrols. That is not to say that two boats cannot, in the right circumstances and with careful management and planning, maintain continuous patrols for a period of time. However, it would be wrong to underplay the difficulties or risks of doing so, or that these increase as the submarines get older. The fact that we have been able to sustain continuous patrols throughout the life of Polaris testifies to the wisdom of operating a four boat force and it would clearly be folly if we did not apply that experience to Trident.
Chairman: Thank you very much. I will ask Bruce George to explore the matter of submarines further.

Mr George

1444. In many ways that debate is now over, and so much has been said on it. What I want to ask about is this. You said to us a few moments ago the VANGUARD has completed contractor's sea trials but they were not very satisfactory. We had one instance to which you referred of teething troubles that had to be rectified, quite remarkably in light of the magnitude of the construction and its difficulties. Were there any other problems that emerged during contractor's sea trials which you think it would be right to tell us about?
(Rear Admiral Irwin) There have been quite a number of problems ranging from the scale of ones we look on as quite difficult to merely routine ones that need to be cleared up. The Sonar 2054 has certainly given a number of problems. The self protection masts had unreliability problems. We have problems with the choice of the right brush for the 700 kilowatt conversion machinery. That is the sort of problem I am talking about. They are all soluble.

1445. All within the range one would expect to have emerged during contractor's sea trials?
(Rear Admiral Irwin) Very much so.

1446. Last year we were told of some four months' slippage in contractor's sea trials. Has this now been caught up?
(Rear Admiral Irwin) We started contractor's sea trials late by four months and the contractor's sea trials lasted the length of time they were expected to, so we have now started the work-up four months late. However, by reprogramming a lot of the work to run in parallel and with the knowledge that we now have of how long things will take such that we are able to pare them down, and because we did some things in contractor's sea trials which we were expecting to do later, it has been possible to contain the whole of that slip, and we still expect to hold VANGUARD'S in-service date.

1447. You said earlier the whole programme was progressing well and within schedule, but with some stories emerging of some considerable slippage in SSBNO8 and the process of construction being less than frenetic, do you believe that SSBNO8 is likely to be subject to some slippage? If so, how much do you estimate it is likely to be?
(Rear Admiral Irwin) We deliberately slipped SSBNO7 to give a better profile of work at Vickers and in doing so we arranged the programme for SSBNO8 to tie in with that, again to give the best programme of work at Vickers. There is no reason to believe they will not be able to stick to that programme.

[**Mr George** *contd*]

1448. By "profile of work" do you mean keeping people in jobs a little longer because the order book is getting a little sparse at the moment? Are you saying it is being deliberately delayed in order to maintain employment?

(Rear Admiral Irwin) We had a deliberate discussion with Vickers to organise it the way that would suit them while also getting the boats available to the programme we need.

1449. VICTORIOUS and VIGILANT seem to be progressing well. Are there any problems which you think should be drawn to our attention over VICTORIOUS and VIGILANT?

(Rear Admiral Irwin) No, because they are so similar to VANGUARD that any problems should have been sorted out in VANGUARD before they get to VICTORIOUS and VIGILANT, and they remain on programme. So I have no worries about them at the moment.

1450. Lastly on that, will SSBNO8 be in service before VANGUARD'S first refit?

(Rear Admiral Irwin) The programme has an operational date of almost exactly the same time as VANGUARD goes to refit.

(Mr Colston) I think in evidence to previous sessions of the Defence Committee we have made clear that there might be a delay of a few months between VANGUARD entering refit and SSBNO8 entering service. That remains the position.

1451. The Polaris programme and Trident is so enormous and yet we seem to do it fairly well. Why should we do things fairly well on Trident and seem to do less brilliantly in procuring almost any other weapons system required to be procured? Is there something special about the Polaris and Trident role? If so, we would be delighted to know.

(Rear Admiral Irwin) It is the Government's top priority and so they have put considerable effort into ensuring that facilities are available to make it work.

Mr McWilliam

1452. So you have not done that for other systems clearly.

(Rear Admiral Irwin) Not to the same level as for Trident.

Chairman

1453. Would it be fair to say the Trident programme is likely to keep VSEL going till the SSN20s are coming on-stream?

(Rear Admiral Irwin) I do not have visibility of the Batch 2 Trafalgar programme but, if that comes in when it was intended to come in when the discussions were held with Vickers, it will all tie in very well together, but I do not know what the plans are.

1454. Can you say what that date is approximately?

(Mr Colston) Chairman, we currently envisage that the workload of construction on the Vanguard class programme will be continuing more or less towards the end of the decade. As to the Batch 2 Trafalgar programme, clearly VSEL will expect to have a major stake in that work, but the precise contractual arrangements for that programme have not yet been finally determined, so it is impossible to make an exact response.

1455. Are we looking at roughly the turn of the century as a target?

(Mr Colston) One would expect some work on Batch 2 Trafalgar to be starting before that, so there would be some continuity of effort.

Chairman: Thank you. We will move now to strategic weapons systems and I will ask John McWilliam to lead on that.

Sir Nicholas Fairbairn

1456. Just before that, you told us the cost of Trident. Can you tell us the benefits there have been, for instance, in the Scottish bases and other places of employment, shopping and economic benefits?

(Rear Admiral Irwin) Undoubtedly, Chairman, it has been a large creator of jobs in the short term while the works programme has been carried out at the Clyde Submarine Base, and in the long term there are a lot of civilians working in the Clyde Submarine Base and, of course, there have also been in the Polaris programme a large number working in the dockyard.

Mr Home Robertson

1457. What is the future for the dockyard?

(Rear Admiral Irwin) My job is to have Trident refitted in time. I am sure that will be dealt with.

Chairman

1458. Before we move on, coming back to the question I asked earlier I do not think we quite got a full answer. I asked on the submarine PWR2 reactor design whether there was any change in the cost or the length of the refit as well as frequency. I think we did not get an answer on cost and length.

(Rear Admiral Irwin) The length of the refit is expected to be comparable with the later refits of the Polaris submarines, of the order of two years to start with, possibly less when we have more experience. The PWR2 itself is not a driving function in that. It has to be refuelled but that is not by any means the only work that is done in the refit. A large number of hull valves have to be replaced and a very large number of maintenance routines have to be done out of the water. They are all brought together in a refit.

1459. What is the cost of that?

(Mr Colston) As far as costs are concerned, Chairman, we expect the broad order of cost for the Vanguard class to be equivalent to the cost of the Polaris submarines. That, however, conceals the fact that the Vanguard Class is clearly a much larger and more complex submarine than the Resolution class, so it does represent something of an achievement that we were able to keep predicted refit costs down to the same order.

[**Chairman** *contd*]

(Rear Admiral Irwin) A lot of effort has been put into availability, reliability and maintainability to make sure there is a very large refit in the same length of time as for the smaller Polaris.

Mr McWilliam

1460. I have some questions about strategic weapons systems missiles. There has been another increase in the cost of the SWS missiles to be purchased from the United States of £26 million over and above the £24 million increase last year, and a reduction in the contingency funds available for that programme of £17 million. Three missiles were purchased in the financial year 1991. Last year the Committee noted that 23 missiles had been purchased in the United States in the financial year 1992 and called for a review of classification of the total UK buy and the purchase period. 18 missiles are to be purchased in the Untied States in financial year 1993, a total of 44 to date. What are the effects of the Bush Administration plans to purchase enough Trident missiles for only the 10 Atlantic based SSBNs? What is the additional implication of the 40 per cent reduction in SSBNs that have come out of the United States lately? What is the implication of the ending of the missile production in financial year 1997 and the terms of START II? Does that mean that we have to hurry up our purchase programme and does that mean costs will rise yet again?

(Rear Admiral Irwin) We have designed our purchase programme in concert with the Americans and so we have been able to anticipate a number of these changes and we do not at the moment expect any change in the amount of money that we have allowed for the missile buy, but I think at this stage I probably need to ask Mr Colston to come in.

(Mr Colston) There were a number of detailed questions there, Chairman, which I will seek to take in turn, if I may. The reduction in the total number of United States Trident capable SSBNs from twenty four to eighteen (which was, I think, one of the factors which you mentioned) was taken into account in the estimate which we presented to the Committee last year, so that is already reflected in our current estimates. There is a possibility that the Trident II missile system will be confined in the United States to ten SSBNs Atlantic Fleet rather than the eight existing Trident I boats in the US Pacific Fleet and we are aware of that proposal and have considered its implications for the United Kingdom's procurement. In fact, having looked closely at the existing United States' procurement plans for their missiles together with our own, we do not believe that there will be any significant impact on our costs as a result of removing what is known as the "missile backfit" programme, because the backfit missiles (those associated with the Pacific Fleet) would have been processed at the US facility on the west coast of the US rather than at Kings Bay in Georgia. There is no immediate interaction between the numbers of missiles: the numbers of missiles in the Atlantic Fleet in the United States is unchanged. As far as the possibility of a reduction in the annual US production rate goes, which gave rise to some speculation in yesterday's newspapers, perhaps I might seek to set that in context. First, perhaps I could make clear that the potential reduction in the US production rate is at the moment a proposal which is under consideration by the US Department of Defense. It has yet to be considered by the White House and is not, I understand, due to be sent forward to Congress until the end of the month. Secondly, I believe there is a risk of underestimating the complexity of the interaction between the costs of the US programme and the costs of the UK programme. It is not possible to take US data relating to the costs of their own missile programme in any one year and to translate that immediately into a cost impact for the UK programme. It depends on how many US missiles and how many UK missiles will be purchased in any one year or years. That is what drives the missile costs. Lastly, I should stress that the Ministry of Defence does seek in preparing its estimate of missiles costs to take account of likely trends in future missiles costs, and likely trends in US procurement, and we take a formal view in consultation with our US colleagues. You have noticed we have reported in answer to your question 3a a £26 million increase in the cost of the strategic weapon system missile programme. We believe that that change, together with the reduction in contingency to which you have referred, is adequate fully to take account of any change in production costs resulting from the US proposal which was reported yesterday. If the proposal is adopted the US Navy will clearly be giving us more information about the precise cost implications, but our assessment at the moment is that if that proposal is adopted there should be no significant variation. The costs may go up slightly or they may go down slightly as a result of that change.

1461. You seem to be adding together the development costs of the Trident II and D5 missiles and then amortizing that and saying "That is what we would pay". Is that a reasonable assumption to go on, given that the new administration in the United States is going to look very hard at its defence expenditure and it would be awkward for it to be paying more for its missiles than we are?

(Mr Colston) There is no suggestion that the United States' Government would subsidise the costs of the United Kingdom Trident programme. They would not be permitted to do so under the terms of the Polaris Sales Agreement as amended for Trident.

1462. But why add the Trident II development costs to the Trident 5 development costs? They are different missiles.

(Mr Colston) The Trident II missile *is* the D5 missile.

1463. Sorry—Trident I.

(Mr Colston) As far as research and development costs go, there is a fixed payment which the United Kingdom makes to the United States and we have given the Committee details of those payments in the past.

1464. In response to a predecessor's suggestion that the total UK missile buy should be declassified,

[**Mr McWilliam** *contd*]
as well as the period of purchase, you told us in August 1992 that "this information could be of value to a potential adversary in assessing future capability of the relatively small UK deterrent, and should therefore remain classified." You cannot be serious! The Americans seem happy enough to do this and to tell the world what they plan to do—not that it matters a lot, but in the new spirit of openness, perhaps you could reconsider that and tell us in public exactly what you intend to do?

(Mr Colston) In the light of the comments which were registered in the Committee's report last year, Ministers did review whether there should be any change to the classification of our future missile purchases, and our total missile inventory, and the view recorded in the Government's response was that that information, given the relatively small size of the UK deterrent, could be of value to a potential adversary in assessing our capability and this remains the view of Ministers—that the added element of uncertainty which is retained by keeping that information classified is worth preserving.

1465. Uncertainty amongst whom? The British public, or everybody else? Because everybody else knows!

(Mr Colston) There will continue to be uncertainty about the profound size of the UK missile inventory for as long as it remains open to us to procure more missiles and that could be for many many years.

1466. But anybody knows that four boats with sixteen tubes each have a maximum capacity of four times sixteen—that is all that can go to sea. That is the calculation they will make. You have got to come down from that—that does not seem to be very uncertain to me now, does it?

(Mr Colston) The potential exists within the Trident SSBN system—the technical feasibility is there—to carry a variable number of missiles (anything from zero to sixteen—one in each tube) and anything which adds to the uncertainty of a potential adversary as to how many one may be carrying at any one time we believe contributes to deterrence.

Mr McWilliam: I do hope Enid Blyton stops writing the briefs for civil servants answering questions like that soon, because it is becoming increasingly unrealistic, Mr Chairman!

Sir Nicholas Fairbairn: Enid Blyton wrote better!

Chairman: I note what you say. Mr Cook?

Mr Cook

1467. I am a simple person and I confess my simple mind cannot see through the responses that have just been given. We have been told already that the Trident programme is top priority in the Government's defence agenda, and yet the considerations that are under way on the Hill at the present time will not have a measurable impact on that programme. I have got correspondence here dated February 19th from Congress which is proposing termination of production of Trident II, the D5. If it is a top priority to acquire this at the present time, how can it possibly have no impact to the Government's programme if they stop making the damn thing to start with?

(Rear Admiral Irwin) That is very much a hypothetical question at the moment ———

Mr Cook: Of course it is.

Sir Nicholas Fairbairn: It is not a hypothetical question!

Mr Cook

1468. Defence needs in the future are all hypothetical. That is why we did not see Bosnia coming. Our job here is to try to examine the scenarios that you people paint for yourselves to see that national defence interests are preserved. You have a top priority on a programme which requires Trident IID5 which may cease in production, so how can that have no adverse impact on the programme you foresee at the present time? That is not hypothetical, is it?

(Rear Admiral Irwin) It might cease in production but we have no indication that it will.

1469. I have. Do you want a copy?

(Rear Admiral Irwin) I have already read it. That does not mean to say that is what the United States Administration will decide to do. At the moment we are working with our United States opposite numbers to arrange joint buys from the manufacturers for our mutually best costs and we will continue to work with them to arrange the best programme.

1470. It is all very "iffy", is it not?

(Mr Colston) The proposal which you are alluding to, which has arisen in both Houses of Congress, to look at the possibility of termination of Trident missile procurement after the current fiscal year would have an impact on the cost for the United Kingdom programme if that was the policy which was adopted by the Administration. But, as the Admiral has made clear, at the moment it is a proposal from individual members of Congress rather than a proposal from the United States Administration. Equally it would not prevent the completion of procurement of missiles required to support the United Kingdom programme.

1471. I find that answer a good deal clearer than the one given previously. Thank you very much.

(Rear Admiral Irwin) That amendment requires the United States to consider the United Kingdom's position.

Mr Cook: Understood.

Chairman

1472. I have two brief points before we move on to the next subject. Taking up what Mr Colston told us on the question of cost, I just want to explore what a "significant cost" is considered to be, given that the £26 million by which it increased last year is not a significant cost in terms of the overall cost of Trident but enough to buy an extra frigate. So when

[**Chairman** *contd*]
you say no significant difference in cost is anticipated, would you have considered £26 million significant?

(Mr Colston) I would have considered £26 million a significant cost variation. We do not believe there would be a significant cost variation as a result of the proposal, if implemented, to reduce the United States annual production rate to 24 missiles a year. I hope I have made clear that, if there were to be more fundamental changes which are not at present under direct consideration by the United States Administration, there might be significant costs.

(Rear Admiral Irwin) Would that £26 million could buy us a frigate, Chairman!

Mr Campbell: It would buy us a regiment.

Sir Nicholas Fairbairn: It would buy us the Gordon Highlanders.

Chairman

1473. There is something you said, Admiral, which I would like to look at. You said you liaise with the United States in order to get the missiles at the best available price from the suppliers. Given that the price presumably fluctuates and there are occasions when you might be able to buy a batch cheaper than at another time, is that a significant element of your purchasing programme or is it more with regard to the timing that you have to have them?

(Rear Admiral Irwin) No, we have already bought enough missiles for immediate needs and the programme for buying in future is geared almost entirely to the best commercial market, while obviously acknowledging that we have to buy the remainder before they are required. There is quite a lot of time in which to do that.

Sir Nicholas Fairbairn

1474. On that matter, if I may, Chairman, do you in making your bid take account of the strength of the pound against the dollar or the weakness of the dollar against the pound? If you bought them this morning you would have got a much better deal than if you had bought them yesterday.

(Rear Admiral Irwin) We buy with dollars that have been bought ahead by the Treasury, so the exchange rate for the year ahead is known. We do not speculate on further years downstream and deliberately postpone buying in the hope that the dollar:pound ratio will be better in the future.

1475. When does the year begin, 1 January or 6 April?

(Mr Colston) The dollars which we will spend in the next financial year 1993-94 would have been bought between September 1991 and September 1992, so we buy between 6 and 18 months in advance.

Mr Campbell

1476. Before a particular Wednesday in September 1992? That is a serious point.

(Mr Colston) No, in the course of the year.

Chairman: We will move on to Tactical Weapons System and I will ask Winston Churchill to take us into those questions.

Mr Churchill

1477. You told us that "good progress" has been made in resolving the outstanding problems with the TWS, with the issue of SMCS software in time for sea trials, and most Sonar 2054 software. Why is the towed array not being tested at this stage of the programme? Is it a hardware problem or is the main snag in the software?

(Rear Admiral Irwin) There is not a main snag with 2054. What worries me is there are so many little snags and the software is one of the bigger little snags. The towed array was a misfortune. Rather than not setting out to test it, we lost the towed array at an early stage of the trial.

1478. It just broke away?

(Rear Admiral Irwin) Yes.

1479. That was the only prototype you had?

(Rear Admiral Irwin) That was the only one on board on the reelable array and reeled in to the submarine. Once it was lost nothing could be done about it until the submarine was back in harbour and another one was made available to it.

1480. When will that now be trialed?

(Rear Admiral Irwin) That towed array is very slightly different from but to a common design for all the towed arrays we have. So it is not the towed array itself that we were worried about trialing, it was the towed array matched into Sonar 2054. So acknowledging that we have had a setback in losing it, when we go to sea again we will have another towed array and have to redo the trials. We were able to go a certain amount of the distance down the trial because we had deployed the towed array and quite a lot of it we recovered. We know the system for deploying and recovering it works, we have covered a lot of the trials but have not actually used the towed array with 2054.

1481. Is it not a not uncommon occurrence to lose a towed array like that or is something about the marriage between the submarine and this particular towed array?

(Rear Admiral Irwin) No, the towed array itself broke, so we were left with part of the towed array still attached to the submarine. We are reasonably confident—in fact, very confident—it was not to do with the VANGUARD that she lost the towed array but to do with the towed array.

Mr Churchill: You have given us a brief note on the difficulties associated with the self protection mast periscopes.

Chairman

1482. There are two more questions I would like to ask on that. Could you tell us how much these things cost?

(Mr Colston) A quarter of a million pounds.

1483. They are, I believe, fairly frequently lost by submarines, are they not?

(Rear Admiral Irwin) They are occasionally lost

[**Chairman** *contd*]
by submarines, more the ones that are attached to the submarine after she is deployed rather than the reelable ones, and one of the great advantages we are hoping to find with the reelable towed array in VANGUARD is that we do not lose the array. It was therefore particularly disappointing that this array broke.

1484. An unfortunate start if that is the objective.
(Rear Admiral Irwin) Very unfortunate. It was the routine array, not the VANGUARD itself that broke it.
Mr Cook: A disarray!

Sir Nicholas Fairbairn

1485. How is it attached? It seems to me quite extraordinary, if you are towing a thing that costs quarter of a million pounds, that you return to port and say, "Sorry, darling, I've just lost a quarter of a million quid's worth of equipment". What is the explanation for the mechanical fault which enabled an object worth quarter of a million pounds just to float away?
(Rear Admiral Irwin) We were not able to find that out until we had VANGUARD back inshore and could get into the compartment which is outside the pressure hull and look at it. So an investigation of that started only a short time ago, and we have not yet come up with any sound reason for why it was lost.

1486. Have you come up with any remedy as to why the next one should not be lost?
(Rear Admiral Irwin) We can only believe that there was a man problem in making a connection, and we shall make jolly sure it does not happen again.

Chairman

1487. Is it possible to test these things on the shore? Can you do shore-based trials with it, or does it have to be taken to sea?
(Rear Admiral Irwin) You can test the array for mechanical strength ashore, but then it has to be connected to the submarine. In doing that part it is taken to pieces and then reassembled.

1488. I see. Do submarines never carry a spare, given that they can be lost and it could be critical?
(Rear Admiral Irwin) No, they cannot carry a spare.

1489. They *cannot* carry a spare?
(Rear Admiral Irwin) No.

Mr Churchill

1490. Did I understand you to say that it was not the cable that snapped, it was in fact part of the array ——
(Rear Admiral Irwin) That is attached to the cable.

1491. —— that broke away from the other part?
(Rear Admiral Irwin) That is correct.

1492. So it was a manufacturing fault presumably, or is there a suggestion that it might have snagged the bottom, or a wreck?
(Rear Admiral Irwin) No, there is no suggestion of that. It was an assembly rather than a manufacturing fault, we believe.

1493. And that would have been done where?
(Rear Admiral Irwin) Well, it could have been done at the manufacturers: it could have been done at Vickers Shipbuilders: I think those are the only two places it could have been done.

1494. Turning now to the self protection mast periscopes, can you explain the seriousness of the problem and why it arose? Are we on the edge of this technology?
(Rear Admiral Irwin) Before I answer your direct question, Mr Churchill, can I just say that there has been speculation in the press that, because the periscopes had problems, the submarines were at risk or were a danger to other shipping. There are three periscopes: they have optical systems just like the periscopes of any other submarine, and there is no trouble with those at all, and therefore the submarine was perfectly safe, and they were able to use the periscopes normally. However, the Vanguard class have added facilities on the periscopes, particularly the television consoles down in the operations room which allow an operator down there to watch the picture without actually looking through the optics of the periscope, and there are thermal imaging and other aids for seeing better. There were reliability problems with the electronics of the masts. We believe we have solutions for the problems. We wait now to include those and take the mast to sea again.

1495. Is this equipment that we have developed or that has been bought off the shelf?
(Rear Admiral Irwin) Barr and Stroud are the contractors, and I do not know whether they have bought in anything from abroad but basically they have taken a lead.

Mr McWilliam

1496. Is this a digital or analog signalling system?
(Rear Admiral Irwin) It is a combination of both.

1497. So it looks like the usual problems of under specification, again?
(Rear Admiral Irwin) It looks awfully like it.

Mr Churchill

1498. There are still later stages of the SMCS and sonar software to come. Does that mean that contractors in the Royal Navy acceptance trials are being conducted without the full system as it will be operationally deployed?
(Rear Admiral Irwin) Yes, it does, but may I do

[**Mr Churchill** *contd*]
exactly as I did with the mast, and point out that that does not mean to say that the system was not perfectly capable of operating under the conditions under which it did operate. The SMCS combines the inputs from a very large number of different sensors of which the sonar 2054 is but one, and then displays a picture for the Commander allowing him to take decisions and to fire weapons. For sea trials it is only needed for the submarine to be safely navigated. She was not seeking to fight and for safe navigation she had all the software for both the sonar and the command system that was required. As she goes out on work-ups, so she is going to need software that allows her to do more and more and we have managed to achieve a programme with industry that allows them the maximum time to produce that software and get it to us in time for VANGUARD's programme. That is not actually a bad approach to receiving software, because you get it, you try it, it goes back for improvement and to have facilities added to it, and my experience of software systems is that a phased approached like that usually ends up by being the best one, so I have reasonably high confidence that it is going to meet its dates.

1499. Is this in any way a derivative of the CACS system for frigates which we had quite a lot of trouble with?
(Rear Admiral Irwin) No. There have been principles of information retrieval and storage and use that have been derived from that, but no, it is a completely different system done by a different firm using a different architecture of software.

1500. At this stage what is actually missing, and is it serious?
(Rear Admiral Irwin) What is missing is the ability to fire torpedoes and if you want to fire torpedoes it is crucial! We do not at the moment at this stage of work on the submarine have the need to fire torpedoes. By the time she goes to torpedo firings we will have that software on board.

Chairman

1501. And they will have had a chance to train with it before they are deployed, will they?
(Rear Admiral Irwin) Yes, they will indeed.

Mr McWilliam

1502. This has been a long running sore in the programme, has it not?
(Rear Admiral Irwin) Yes.

1503. And the previous Committee were assured I think two years ago that a solution had been found and there was every confidence that when it was installed on the boat it would work. What happened since then, because you did have a recovery programme still then?
(Rear Admiral Irwin) The recovery programme remains basically the same as it was then, and the software we have on board has worked. That is not to say it has not had faults that we have wished to improve, but actually it has worked quite well within the limits that it does not yet do everything. Each of the phases that will come mean that it will become both more reliable, more useful and better for the purpose.

1504. That is the point I am making. We were assured in the previous Committee that those phases would occur in time for the boat to put to sea with a not fully operational system. Clearly that has not happened.
(Rear Admiral Irwin) They will arrive in time for the boat to deploy with a fully operational system.

Sir Nicholas Fairbairn

1505. And there will not be a need for them in the meantime?
(Rear Admiral Irwin) Well, the submarine will not be operational until she is ready to deploy.

Mr Churchill

1506. Now that VANGUARD is at sea and waiting acceptance trials, can you judge how serious the three to four year delays in the sonar software epic have been, particularly in leading to trials in the shore development facility having virtually no lead-time over trials in the boat, and what do you learn from this?
(Rear Admiral Irwin) The seriousness is in the effect it is having on people doing hard work. It is not having an effect on the submarine. The shore development facility is working extremely hard at the moment to turn the software trials over and have defects put right before the software is sent to sea. I know, because I visited there a short time ago, that the people who are writing the software are working extremely hard and I mentioned earlier on that one of my worries was the tightness of VANGUARD's programme. VANGUARD has more to do as a result of these delays, and it is making her programme very tight. Lessons to be learned: in hindsight, moving to the SMCS some way through the development of VANGUARD was an excellent long term decision which will end up with VANGUARD having a very much better command system, but it has given us a lot of trouble in actually getting there in time.

1507. It was very much an afterthought?
(Rear Admiral Irwin) It was not the original specification.

1508. Will sonar 2054 be read over to the new class to follow on the Trafalgar class?
(Rear Admiral Irwin) 2054 as an entity, no, because it is designed to fit around the very large hull shape of the VANGUARD class and because it has been deliberately designed in the defensive role to give maximum range while concerned less about performance close in. Obviously you can attune a sonar to achieve the characteristics that the submarine needs and that is the way we have done it for the VANGUARD class, but the technology, the way of writing software, and many of the fundamentals that when pulled together make the 2054 are indeed

[**Mr Churchill** *contd*]
common to not just the next design of sonar set in submarines, but also in surface ships.

Mr McWilliam

1509. Can you confirm that you are still using Ada software?
(Rear Admiral Irwin) Yes, we are.

1510. Is not she a bit long in the tooth now? She has been around over 25 years.
(Rear Admiral Irwin) Can I just check my facts. 1983.

1511. Yes, I know, but she was developed much earlier than that.
(Rear Admiral Irwin) Ada has a tremendous advantage in that it is very easy to find bugs, faults that you made in writing the software, and that ability makes it an extremely useful tool when you have very large programmes such as these.

1512. Which is why we had to spend a lot of money to develop new tools to use it on Trident. Have we got recompense for that by selling to anybody else?
(Rear Admiral Irwin) The lessons we learned, for instance, with the Trident SMCS are being read straight through to the frigate system.
Chairman: I will ask Michael Colvin to take us on to warhead testing.

Mr Colvin

1513. I would like to ask how much of a nuisance it would be if we could not conduct any more nuclear tests and why? Would it affect the Trident warhead programme or just subsequent programmes? Do we still need any more Trident tests?
(Rear Admiral Irwin) If I may answer the Trident side and ask Mr Witney to take the rather more general side of that question, the Trident tests have all been completed and, as far as developing a warhead for Trident is concerned, we need no more tests, it would not matter. But we do need tests to maintain our confidence in nuclear warheads in general and the Trident warhead in particular.

1514. From the point of view of its effectiveness or from the point of view of its safety?
(Rear Admiral Irwin) From the point of view of ensuring that we have competence to assess and handle its safety, not its effectiveness.
(Mr Witney) If I can expand a little on that, the underwriting of the safety of the stockpile over time ultimately depends on the competence and expertise of the design teams at AWE charged with that task over the twenty or thirty years of the life of the system. Any warhead is subject to aging processes. These are not necessarily wholly predictable, so you rely on your designers to assess the implications of such changes and to continue to underwrite the safety and, indeed, the reliability of the system through its life.

1515. In that case, going back over the last few decades, can you tell us how many tests have been related to the development of nuclear warheads and how many have been related to the safety factors which you mention?
(Rear Admiral Irwin) It is not as specific as that, because in doing one you do the other. There have been, I think, three—I wait to be corrected—specific tests to Trident, but all of those also, of course, explored safety and developed further knowledge.

Chairman

1516. Further knowledge on safety only, if I understood correctly what you said earlier on.
(Rear Admiral Irwin) Further knowledge on nuclear weapons in general but safety in particular.
(Mr Beaven) Could I add to what the Admiral has said? Our design evolution of nuclear weapons ever since they first came into service has been very much towards making improvements over a wide number of areas of performance and safety is only one of those. I think over the period in which testing has been carried out virtually every test you could say had got safety implications associated with it.

1517. Would it be possible to say whether in earlier tests it was primarily development or primarily safety?
(Mr Beaven) It would be very difficult to isolate a test and say that was a safety test. Certain tests, even tests to prove a production standard or near production standard warhead, could very well have an added element within the tests which was purely related to safety. They are not a simple test of just a warhead. Very often there are several experiments within the general description of the underground test itself.

Mr Colvin

1518. Am I right in thinking the Americans have decided they would not do further tests on their Trident warheads?
(Rear Admiral Irwin) Specifically on their Trident warheads, that is correct, but having decided they do not need any further tests.

Mr Campbell

1519. They have a moratorium currently, have they not?
(Rear Admiral Irwin) Yes.

Chairman

1520. I thought they had a moratorium.
(Rear Admiral Irwin) They have. A moratorium and a decision that they do not need further tests are not necessarily the same thing. They do indeed have a moratorium.
(Mr Witney) Would it be helpful if I said a word about the legislation? They have a moratorium at the moment. Current congressional legislation provides that testing could resume after 1 July of this year for a period of a little longer than three years and contemplates a final end to testing as from September 1996. That is the current position. The

[**Chairman** *contd*]
new United States Administration are reviewing their policies on the way forward on nuclear testing. The legislation required the President to produce a report on the way ahead for the Congress by 1 March. The Bush Administration produced such a report as a final act. The new President said he does not regard that as an adequate response to the Congress and is working up a further response which I imagine can be expected to emerge in the coming weeks.

Mr Home Robertson

1521. If I can follow up the first answer the Admiral gave us on the general issue which seems to me to be slightly contradictory, he started by saying testing was finished and Trident was ready for deployment—the British Trident weapon, the whole system, was ready and safe for deployment—but he went on to say in the same breath that he wanted more tests in order to establish greater safety. You cannot have it both ways.

(Rear Admiral Irwin) No, that was the point that was developed on my right, that in order to be able to look after nuclear weapons you need people who have an understanding of nuclear weapons and to have an understanding of nuclear weapons it is no good just designing them, then designing another one; you have to put your thoughts to the test by carrying out a nuclear test. If you do not carry out a nuclear test it is possible to convince yourself you understand what you are doing when you do not.

1522. The thing is either safe and fit to be deployed or it is not.

(Rear Admiral Irwin) The Trident warhead is perfectly safe and fit to be deployed but we want to have people who have the competence to understand nuclear weapons so that in twenty years' time, if somebody scratches a weapon or whatever, or there is corrosion on the outside, we will have people with enough knowledge of nuclear weapons who can look at what we have found wrong with it and take an informed judgment as to what needs to be done.

1523. Another three tests in what is left of the time available will do it?

(Rear Admiral Irwin) There is no further need for testing Trident weapons. Any further tests we would use to enhance our knowledge of nuclear weapons.

1524. For other weapons, for TASM?

(Rear Admiral Irwin) Possibly for other weapons.

(Mr Witney) Could I make the point that there are, of course, alternative technologies to testing in terms of methods for proving the safety of warheads. These have been under development for quite some time and are extensively used by AWE at the moment. The situation is currently that we do not regard those as a fully adequate substitute for every now and again seeing how the thing actually works in practice by having a test. It gives you the opportunity to touch reality, to relate the predictions of your theoretical calculations to empirical results. Now, the prospect of three further tests to which you referred should enable us to make further strides down that road towards establishing and validating and further developing alternative methods of testing. What the situation would be in 1996, how much progress we may have made, is a little hard to say at this juncture.

Mr Cook

1525. When previously posing questions on one-point safety of these systems, we were given a written response some time later which stated "The Committee can be assured that our Trident warheads have now been definitively assured to be one-point safe." Is that correct?

(Rear Admiral Irwin) Yes.

1526. How was that assessment concluded?

(Rear Admiral Irwin) I think I had better turn to the expert here, Mr Beaven.

(Mr Beaven) In terms of the clearance of a weapon going into service there is a complex process involving a number of review bodies and involving the design authority which is based at the Aldermaston Establishment. There is a range of tests done; there is a range of calculations done and the results of those are put forward and compiled into a safety statement which is signed and authorised by the Establishment, and that safety statement is reviewed by bodies within MoD and by bodies external to MoD, and as a result of all those assessments a judgment is made whether that warhead is safe, and that has been done for Trident.

1527. But it was not done in actual firing because the moratorium would not allow it, is that right?

(Mr Beaven) No. It takes account of evidence which is produced from the warhead trials for Trident, which includes the actual underground tests which were some years ago, but also evidence from a number of other tests as well—not all of which involve a full detonation of the weapon. The circumstances seen by a weapon which could make it unsafe are varied and complex, and you do not need to subject the weapon to a full detonation in order to assess whether it could be safe under a lot of those conditions.

1528. I welcome that statement, Chairman, because in fact this particular need for testing has been cited by ministers in response to the question whether computer modelling is not, in fact, adequate and they say they would need to test fire in order to fully prove the weapon.

(Mr Beaven) What I am saying is there are a range of circumstances which can cause a weapon to be unsafe. Some of those can involve testing and some of those can be done without testing. In order to make a total assessment of a new warhead testing is essential, but you do not only rely on the tests to assess whether a warhead is safe. Arguably a test is a situation where the warhead is unsafe, and in a lot of cases you want to test the warhead to assure your-

[**Mr Cook** *contd*]
self that it is safe, and therefore you do not need to go to full detonation.

1529. So really you are saying that the Minister has been misinformed?

(Mr Beaven) No—I am saying that for safety purposes there is a lot of testing associated with safety which does not involve an underground test. Underground tests form some of the testing, but there is a wide range of other testing associated with the carriage and storage of the weapon which does not require underground testing, but an underground test is an essential part. It is very essential for understanding the behaviour of weapons under the circumstances you have quoted, which is single point detonation, so arguably a single point detonation shows the weapon to be safe and we have confirmed Trident is safe. It does not result in any nuclear yield and therefore it would not represent a full underground test in order to assess that particular element of safety, but safety is much broader than just single point.

(Rear Admiral Irwin) Also you talked about computer modelling: that was the point Mr Witney was making earlier. You cannot just rely on computer modelling and then develop one model and then another one based on that one. You have got to touch reality.

1530. It all sounds like people sitting round a table and telling everybody how correct they were to me.

(Rear Admiral Irwin) That is why we need to do tests.

Chairman

1531. While we are dealing with this specific point, can you clarify whether the statement that "Trident is one-point safe" is a result of the Oxburgh report, or whether subsequent work has been done on it which you are now relying upon?

(Mr Beaven) At the time Professor Oxburgh took his evidence and wrote his report, as I indicated previously the safety case for Trident is developed over a period taking into account a lot of evidence, so there was preliminary evidence available at the time to suggest that it was one-point safe, but since then there has been further work done. It has been further reassessed, and has now completed that process and I can confirm categorically that Trident is one-point safe.

Mr George

1532. The United States is likely to be restricted to fifteen tests up to September 30th 1996, and we apparently are going to have a very small slice of that and some people say maybe even one in that period. In the light of what you have said, and what the US Navy have said about testing, you are fairly relaxed, are you, about being restricted to only three, two, or maybe even one test, up to 1996?

(Mr Beaven) I think the Committee will be aware that we would normally, over recent years, have tested approximately once per year in some cases slightly longer than that. Currently we are allocated three tests over that three year period therefore the rate of testing is very similar to that which we have found adequate over recent years, so we do not believe that the current proposals will in fact provide any specific restrictions.

1533. If it is three, but it is very possible that we might be squeezed even further, do you think it is possible therefore to cope with all of the different forms of testing that you have spoken of? Could we make do with one or two, and if there is a comprehensive test by treaty that would mean probably we would have none. Would that be copeable with?

(Mr Beaven) I have no indication that we are likely to be squeezed. We have to put forward our proposals for the use of those three tests in the same way that the United States are putting forward to Congress their proposals for using the three tests. We have been given or we have been asked to put forward proposals for three tests and I have no indication that these will not be accepted.

(Rear Admiral Irwin) Where it will be particularly important to us is in developing our understanding of how to test without doing a test that requires a nuclear yield, and that means developing alternative tests—hydrodynamic tests and things like that that can be done at Aldermaston—and those need to be validated by doing nuclear tests and the earlier we stop doing nuclear testing the more difficult it is going to be to achieve non-nuclear testing that is representative of nuclear testing.

1534. There is an enormous head of steam, because of the arguments over non-proliferation, to put a stop to testing. You think this would be quite feasible then? The arguments are quite strong now. I would have thought one could at least with a limited number of tests or even with none at all find adequate alternatives, could one not?

(Rear Admiral Irwin) We would not wish to be put in that position, because if you are not going to do the tests, we would not be able to develop our understanding.

1535. I was reading something which was said by an informed American named Ray Kidder, and his argument was that if you are going to have a new nuclear system or nuclear warhead, " ... then for God's sake don't get involved in any control regime for three or four years, because that is when any problems that might emerge are going to emerge"—after that. In other words, there is no likelihood of any problems receding or being dealt with by other methods of testing. Have we reached that point of four years yet, or have the Americans reached that point with Trident in your estimation? Can one feel fairly secure in not necessarily having further testing?

(Rear Admiral Irwin) We would not need further testing to develop the warhead—that is definite.

Mr Colvin

1536. We did not get an answer to the question about tests on tactical nuclear weapon warheads. How many have there been on, for instance, a TASM warhead?

(Mr Beaven) We have had a programme of underground tests over recent years, as you will be aware, and that programme has in some areas concentrated solely on Trident. In other areas it has developed technologies and a lot of those technologies have got safety implications. There has been a number of technology demonstrations, if you like—tests which will have relevance to a TASM warhead—but there has been no specific TASM warhead project test to date.

Mr Home Robertson

1537. May I just put another quick question on testing: I see that the United States Congress is considering a bill which would require any foreign nation conducting tests in the United States to pay the full costs associated including environmental clean-up of the test site. Have you any views on this? What would the cost be?

(Rear Admiral Irwin) It depends really what they intend to do when they talk about "environmental clean-up".

1538. Presumably they mean what they say.

(Rear Admiral Irwin) The only way you get environmental problems is by doing above ground testing, and we have not done any above ground tests at the Nevada test site. If you are talking about underground testing, all you can do is take the contaminated material that is underground, dig it up and bury it somewhere else, and that does not sound logical! The reason we do tests underground is to contain it underground, and so I do not believe that we would be involved in any major clean-up other than that for which we already pay as part of the contract when we test. I do not know whether Mr Beaven or Mr Witney can add to that?

(Mr Witney) I have nothing to add. I am slightly baffled to know what the implication of this bill would be.

1539. You have demonstrated that. What do you pay now towards the costs of the tests?

(Mr Beaven) We pay a figure which we agree with the United States DoE which takes account of the general overheads of the site. I do not think that is a figure we have released previously and I am not sure whether we would do so. I would not wish to give you a figure across the table.

1540. If you have agreed it with the United States DoE you might be prepared to reveal it to the House of Commons Select Committee on Defence.

(Mr Beaven) It is a private arrangement between ourselves and the Department of Energy. If the Committee wants that figure I can take note of the request. However, I would not wish to provide that figure this morning.

Chairman: I think we might if we could have that figure from you on a classified basis.

Mr Home Robertson: We could ask the United States DoE when we go next week.

Chairman: That is another way.

Mr Home Robertson: That is the usual way.

Sir Nicholas Fairbairn

1541. One thing I am getting increasingly confused about is the language. You use the word "testing" to mean firing a thing and seeing what happens when it lands and does or does not go off, and also for seeing whether there is lipstick on the end of the warhead and whether or not it is safe to handle or has a scratch on it or something. It seems to me a misuse of language to say those are both tests. I would have thought testing to see the effect of the weapon on explosion is quite a different thing from domestic use.

(Rear Admiral Irwin) I have chosen my words badly. I was not intending to convey that when I talked about scratches on the warheads. We need the people with knowledge to look at any problem we may find in the warhead and from their experience of nuclear systems to determine what should be done about it.

1542. What word would you use because, if we are restricted to, say, one test, as Mr George suggested, we would not want it to be a test as to whether there was a scratch.

(Rear Admiral Irwin) No, a test would be something that caused a nuclear detonation of some kind—which can be very small, of course.

(Mr Beaven) I think there is a point we have not quite developed properly. That is, in order to ensure the continuing safety of a warhead like Trident over its full operational life there are very often problems associated with aging, as I said before, which need to be assessed by a competent designer and the competent designer will be at Aldermaston. The competent designer is competent in the right technologies because of his other work, generally associated with testing; and the testing of a different warhead entirely will give him a competency which he can then apply to the Trident programme later in its life. That is our concern. With a restriction of testing in the future the competency of the relevant people at Aldermaston will decay, fall off, until the point where they are unable or unwilling to say "This is still safe".

Chairman: Perhaps we can leave that now. I will ask Menzies Campbell to take us on to the technical side of warheads.

Mr Campbell

1543. Ministers have made it clear in the past that they are not willing to go beyond saying a Trident submarine will not carry more than 128 warheads. Could I ask some questions on the technical capacity for varying that figure. Is it the case that a submarine could put to sea with any number up to 128, that is to say, there is an infinite variety in the allocation of missiles and warheads between zero and 128?

[**Mr Campbell** *contd*]

(Rear Admiral Irwin) Yes, technically that is absolutely correct.

1544. I take it therefore that in time of low threat or risk a political decision could be taken to put submarines on station with a lower number than perhaps might be thought appropriate at a time when the risk was conceived to be more acute?

(Rear Admiral Irwin) Again technically that is absolutely correct.

1545. Are you in a position to tell us whether any decisions have yet been taken as to the normal complement of warheads to be deployed on one of these submarines on station?

(Rear Admiral Irwin) The only decision that has been taken is what to buy, which bounds the choice that can be made closer to the time. There is no need to take a decision today, nor will there be until much closer to the time, as to what each submarine will deploy with when she goes out.

1546. I think it is self-evident really from our previous questions and answers that the determination of this is something which will lie entirely within the political arena based on an assessment of the risk which is thought to be prevalent at the time?

(Rear Admiral Irwin) Yes, absolutely correct.

1547. Let me take you on to another matter. It has been suggested on a number of occasions that the Trident system could be used to provide a substrategic deterrent. I think Lord Lewin first gave that a fair wind approximately 12 months ago, and as recently as Jane's "Defence Weekly" of 6 March in discussing analyses about the United Kingdom's tactical nuclear weapons it says, "Perhaps the most logical, and among the cheapest, options is a tactical warhead Trident or a Tomahawk cruise missile bought or leased from the United States." Perhaps I could concentrate on the tactical warhead Trident. Is it technically possible—I think you may already have answered this—to put one warhead on one missile and for that to be capable of being used if circumstances required it?

(Rear Admiral Irwin) Yes, that is technically possible.

1548. Would one warhead on one missile be capable of fulfilling the expectations of a tactical air to surface missile?

(Rear Admiral Irwin) Yes.

1549. Do I take it then that in terms of accuracy and in terms of range there is no, as it were, prejudice in using one warhead on one missile on the Trident system as compared to using a tactical air to surface missile with no optimum range for Trident, which would not, as it were, permit the use of Trident for substrategic purposes?

(Rear Admiral Irwin) There is no range constraint that would seriously affect Trident. It has a maximum range, it does not go the whole way round the world, but there is little constraint on range.

1550. The CEP remains the same, whatever the range, from zero to maximum?

(Rear Admiral Irwin) Not absolutely exactly, but within small bounds that is correct. There is a minimum range but not one that gives a problem operationally.

1551. Are you able to tell us what that minimum range is?

(Rear Admiral Irwin) I regret not.

1552. If you will not tell the world, will you tell the Committee by way of note?

(Rear Admiral Irwin) Certainly.

(Mr Colston) Perhaps we could make the point that it is always possible to move the submarine.

Mr Home Robertson: Are you sure?

Mr Cook: That is not a secret.

Mr Campbell

1553. Is it also feasible then that the submarine could go on station with the capacity to deliver both a strategic deterrent and a substrategic deterrent?

(Rear Admiral Irwin) Yes. You do not have to have different weapons; it is just the different use of the same weapon.

1554. I am not particularly well versed in the technicalities of these matters, but would that loading, as it were, have to be made before the submarine left port or is that a flexibility which the commander would have, depending on the instructions he was given by his political masters? Could he do it, as it were, within the ship?

(Rear Admiral Irwin) There is not a straight yes or no answer to that, because it depends on how far you want to explore flexibility. Once the load has been put on board then that provides a constraint. Within that constraint there is a certain amount of flexibility, but it is pretty well constrained by what has been put on board when the submarine deploys.

1555. So, putting it rather crudely, when you load up the submarine and send it out, you have within certain constraints determined the nature of the deterrence that might be available?

(Rear Admiral Irwin) Not entirely, because again it depends on the use to which it is being put. A weapon that can be put to a strategic use by one form of targeting can be put to a different form of use by a different form of targeting.

1556. So the flexibility then is to be found in the targeting of the weapon, is that what you are saying?

(Rear Admiral Irwin) Part of the flexibility is to be found in the targeting. The load of the weapon in the first place; how many warheads it has on it is of course another factor and that cannot be changed once it is loaded.

1557. So you have load, and then you have targeting as being the two components which give flexibility? Are there any other components in this analysis?

[**Mr Campbell** *contd*]

(Rear Admiral Irwin) Well, the number of missiles you have on board would be a factor, and the position of the submarine within its remaining constraints.

1558. Of course.

(Rear Admiral Irwin) I cannot immediately think of any others.

1559. So load, targeting, range, and the number of missiles. These may all contribute to flexibility, is that right?

(Rear Admiral Irwin) Can I just make sure I have not missed any, because this is an important question.

(Mr Witney) No, I think not.

(Rear Admiral Irwin) I think that is a comprehensive answer.

Chairman

1560. Before we move off this, can I just clarify one point? Presumably the balance of the submarine is a fairly delicate matter. Is it possible to fire, say, one tube and not fire the others?

(Rear Admiral Irwin) Yes, that is perfectly possible. There is a compensation system on board, so when the weight of a missile leaves the submarine, the compensating weight of water goes into the submarine.

1561. And the other point I did not quite understand is this: having loaded the submarine, is it then possible to change the warhead structure so that you can fire one missile strategically and the others be strategically loaded with multiple warheads?

(Rear Admiral Irwin) One missile could be fired to achieve a sub-strategic aim, and another missile in the same submarine could be fired to achieve a strategic aim, but you would not wish to fire one missile to achieve both.

1562. I absolutely understand that, but when you load your submarine, let us say for the sake of argument that you have loaded all but one with strategic multiple warheads, but you have also loaded another single warhead not attached to a missile, would it be possible in, as it were, midstream to change the warhead so you had two sub-strategic?

(Rear Admiral Irwin) No. Once you have put the warheads on the missile and the submarine has gone to sea, you cannot change that.

1563. So what I was really getting at was whether you could change the warhead when the submarine was at sea?

(Rear Admiral Irwin) No.

Mr Campbell

1564. The set is determined before the boat leaves the pen, is that right?

(Rear Admiral Irwin) That is correct.

Mr Churchill

1565. On that point, is it possible in any way to vary the yield once the submarine is on patrol?

(Rear Admiral Irwin) No.

Mr Campbell

1566. Could I ask a question or two about the Moscow criterion, because as I understand the position, the proposals for the D5 system are predicated on the assumption that it would be necessary or it might be necessary to provide sufficient capability to overcome the ABM defences round Moscow. How rational is that criterion at a time when we have adopted a doctrine of nuclear defence of minimum deterrence which is generally defined as being "the ability to inflict upon a potential aggressor a level of damage greater than he is willing to sustain?" Is it necessary to maintain the Moscow criterion at a time when minimum deterrence is the accepted nuclear doctrine not only of the United Kingdom but indeed of the North Atlantic Alliance?

(Rear Admiral Irwin) You are going beyond my procurement function and in a moment I will ask Mr Witney from the Defence Staff to answer that specific question, but can I just say that when we set out to procure Trident, the Moscow ABM defences were certainly in the minds of those who sized the system.

(Mr Witney) In amplification, I am not aware that we have ever said that even in the depths of the Cold War there was such a thing as the Moscow criterion.

1567. It is generally accepted, though, is it not?

(Mr Witney) I think the nearest we have ever come to that was perhaps ten years ago in talking about feeling the need to have "the ability to hold out a threat to key aspects of Soviet States' power"—well, that phrase is clearly no longer operative. I think we would wish to rest our case at the moment, simply on the point you have made. We feel the need to be able to hold out to the potential aggressor a scale of damage which would manifestly outweigh any gain he could hope to make from aggression. In making that calculation obviously we have regard to the possible attrition of a strategic strike by ABM defences. Now, today, currently, there is only one operational ABM system in the world, and that is around Moscow, but that is not to say that we are necessarily operating to a Moscow criterion nor is it to say that ABM defences in the future are going to be restricted to Moscow.

1568. If I were to ask you the question whether Polaris was deploying an effective deterrent with the number of warheads which it provides, you would undoubtedly tell me "Yes".

(Mr Witney) Yes, I would!

1569. And that would include, necessarily, if the Moscow criterion is a relevant factor, that in your calculation and in your answer. What I find a little difficult to understand is why we have to have the enhancement of warhead numbers which the D5,

[**Mr Campbell** *contd*]
with 128 warheads per boat, would undoubtedly bring, if conditions vis-a-vis ABM round Moscow are predicted as they must reasonably be at least at this stage to remain the same as they are at a time when Polaris is effective?

(Rear Admiral Irwin) That takes me back to the point of when we procured Trident we procured it under somewhat different circumstances, and we did not procure Trident for the large number of warheads it could carry. We procured it because it was the most economical system we could buy and would be supported by an ally for the length of time we expected to operate in.

1570. I quite understand all of that, and I have got some sympathy with most of it, but I thought the most interesting thing you said was "the changed circumstances". Most people perceive that the threat of a nuclear exchange between Moscow and London has diminished in recent years rather than increased. Is that not of itself a pretty compelling argument for a deployment of warheads significantly below 128 and no greater than those which are presently deployed on Polaris?

(Rear Admiral Irwin) Ministers have always made clear that 128 was the maximum number. They have not said it was a specification.

1571. Yes, I know, but I am asking a question designed to test whether or not that figure of 128 is necessary.

(Mr Witney) That decision has not been taken. The decision on how many warheads are actually to be deployed is to be taken nearer to the time of Trident coming into service, with a maximum derived from, as I am sure you know, the load that could have been carried on the C4 missile which was our original intention to purchase, and the self-denying ordinance was proclaimed in relation to D5 that we would not use more warheads in the boat than would have been the case with the C4 missile.

1572. So there is all to play for for those of us who wish to persuade the Government that 128 is unnecessary?

(Mr Witney) The number to be deployed has yet to be decided.

Chairman

1573. Can I come back to the question of targeting? I am not quite clear whether it is still the case that the targeting of our Trident fleet, once it is in operation, will be in liaison with Omaha, and whether it is therefore, if you like, pre-set by NATO decision-making?

(Rear Admiral Irwin) We have declared the strategic system to NATO and we plan and deconflict our NATO target plans with the targeting centre at Omaha.

1574. Have any changes been made recently to those plans?

(Rear Admiral Irwin) I know that a lot of changes have been made but I do not have that visibility of what they are. I can answer "yes" but I cannot go any further than that.

1575. I would not have asked in public session what they were.

(Rear Admiral Irwin) I know Ministers have always made it plain that we retain the right to use Trident away from that should there ever be an overriding national need.

1576. My next question is concerned with the degree of flexibility available in targeting. Is it possible for, let us say, a decision-maker in London to instruct a submarine commander to re-target the missiles on his vessel?

(Rear Admiral Irwin) Yes.

1577. That can be done without any problem?

(Rear Admiral Irwin) It requires communication, of course.

1578. Is there any problem to the captain in carrying out that command in his vessel?

(Rear Admiral Irwin) No trouble at all.

Mr Cook: On the point of communication, how dependent is our effective targeting on, let us say, American satellite control?

Chairman

1579. I do not think you want to answer that in public.

(Rear Admiral Irwin) I would be prepared to answer that: Operationally there is no dependence. Operationally and at the time ———

1580. We could target Omaha then!

(Rear Admiral Irwin) We *could* target Omaha.

Chairman: And they could target us. (*Laughter*)

Mr Campbell: It would cause a bit of a riot in Northwood if we did.

Chairman: I think you can take it that is a hypothetical question. Can we move on to arms control and I will ask Bruce George to come in.

Mr George

1581. This is not strictly a matter of arms control but is it technically possible for you to purchase this large supply of US-surplus Trident 1 missiles? I can certainly see the cost and arms control arguments, but I am wondering whether it is technically feasible, obviously not in the SSBNO8 or 09 but for later ones?

(Rear Admiral Irwin) For us to build a submarine to take the Trident 1 missile?

1582. Yes, which we would not have to construct ourselves but could buy off the shelf from the United States—because of their enormous reduction in missiles these are surplus and will not be required. I am just exploring the possibility as to whether there would be any insuperable technical difficulties.

(Rear Admiral Irwin) Technically it is possible,

[**Mr George** *contd*]
but the whole of the VANGUARD class submarine has been designed around the bigger Trident 2 missile and so it would be a major redesign. I do not know whether the Director General Strategic Weapon Systems can tell you what the differences would be.

(Dr Catchpole) There are very substantial changes we would have to incorporate into the design. I could not contemplate what the cost of those might be. I anticipate they would be prohibitive. We have already made very substantial investment in the purchase of the Trident 2 missiles which we would clearly wish to retain.

1583. I am not saying it is a *volte face* but recently they were going to buy Trident 1 and now they are going to have a very substantial over-capacity and we will probably be putting coca-cola tins in the missile tubes because we do not know what else to do with them, in light of the changed circumstances from the original conception of the need for Trident, not whether the technical cost of modifying the submarines and missiles would be less than the savings that might accrue from not having to produce more warheads and simply purchasing off the shelf.

(Rear Admiral Irwin) I do not think we could give a very good answer to that. We just have not costed it. I can give the sort of things that would have to change. We would have to put sleeves inside the missile tube to hold the much smaller missiles. There would be extensive changes to the gas generator, the charge that ejects the missile from the submarine would have to be completely different and the pipework from that to the tube would have to be changed. The guidance system is different and so both the systems that maintain the guidance system in the right ambient temperature and humidity would have to be changed. The whole of the fire control communication with the guidance system would have to be changed—and I am only beginning to explore the changes that would be needed. There would be so many I can well believe that the cost would outweigh the advantages of purchasing secondhand missiles.

Mr Home Robertson

1584. Still on arms control and implementation of START II, Ministers tell us that we have an effective minimum deterrent on patrol at present with 48 warheads on Polaris. We are about to up the ante by commissioning capacity to go on patrol with Trident 128 warheads. Are we going to put that extra capacity into arms control talks?

(Rear Admiral Irwin) I turn instantly to Mr Witney.

(Mr Witney) I think firstly there is no invitation on the table to us to put anything into arms control negotiations. START I was initially a bilateral process which broadened out to encompass the other three states of the former Soviet Union with former Soviet strategic systems on their territory. START II has been a purely bilateral arrangement between the Russians and the Americans. The Americans have gone on record in reporting that to the Senate to make the point that this does not bear upon the United Kingdom's right to test and to deploy its Trident missiles in whatever configuration it wants. There is not an arms control negotiation waiting for us to join. I would say, if there were, we would have to be very cognisant of the fact that we are operating a minimum deterrent. This implies you are operating close to the margins of credibility in what you can deploy and I do not think we would wish to find ourselves constrained at this stage by moving into an arms control process.

1585. But we already established in earlier questions that it would be technically perfectly feasible to carry a smaller number of warheads on board, and Ministers have said recently we have a credible minimum deterrent with Polaris with 48 warheads at the time. So it is technically possible and I hope you are not pulling that out as a possibility?

(Mr Witney) Not at all. The option of not deploying 128 warheads is very much open, as Ministers have made plain.

1586. Moving on from the question of START, what about the impact of the deployment on the non-proliferation treaty which is up for renewal in 1995? Surely you recognise that this substantial increase in number of warheads employed by a small nuclear power like Britain is not exactly likely to encourage either existing nuclear states like the Ukraine to foreswear their weapons or, indeed, encourage other non-nuclear states to continue their participation in the NPT?

(Mr Witney) There is, of course, nothing in the non-proliferation treaty which prohibits one of the five acknowledged, recognised nuclear weapon states from replacing a system if it reaches the end of its life.

1587. But increasing numbers?

(Mr Witney) I think we would point to the record of what we have done over the last two years which has been very substantial in terms of reducing the substrategic element of our arsenal. We have taken steps to reduce the number of Tornado strike squadrons from 11 to 8; we have given up entirely the maritime substrategic capability, the shipborne WE177 capability. That has gone entirely. That is a step we have taken which is more than other nuclear powers have done. And we have announced the reduction by more than half of the WE177 stockpile. These are very substantial contributions we have already made in the last 18 months to two years in the process of reduction of arsenals amongst nuclear powers.

1588. We expect the Ukrainians to do away with nuclear weapons altogether while we increase our strategic arsenal from 48 at a time to 128 at a time. That is not very credible, is it?

(Mr Witney) This is a commitment the Ukrainians have freely entered into. They have committed themselves to do just that.

[**Mr Home Robertson** *contd*]

Mr Home Robertson: If I can move on to another area, the question of handling ———

Mr Churchill

1589. Before you do that, is it not the case that taking the more than 20 years since Polaris was deployed with the Royal Navy, this increase from 48 to 128 warheads represents a significantly smaller increase proportionately on the United Kingdom's part in actual warheads than on the part of either of the other superpowers?

(Mr Witney) I imagine that must be right in mathematical terms comparing the position in the late 1960s with the position now. How the sums would work out, looking ahead to the time when hopefully START II reductions have gone through and the two nuclear superpowers' arsenals are reduced to 3,000 warheads or so, I am not sure.

Mr Home Robertson

1590. I think this is one area where we would all like to see zero inflation all round! Moving on to handling and safety, if I may, Chairman, the Oxburgh Report recommended that, and I quote, "Studies continue in order to further understanding of the potential hazard of Trident missile loading and unloading, and to ensure that it is minimised in every situation." You have told us in a written answer that all aspects including missile handling procedures are being examined. The Oxburgh Report casts some doubt on Drell's preference for mounting warheads onto missiles already in the submarine, which is the United Kingdom practice. Can you explain whether that remains the intention and the progress of the studies that have been recommended?

(Rear Admiral Irwin) Certainly. I will ask Dr Catchpole to give you an answer.

(Dr Catchpole) Thank you, Chairman. For Trident we will be adopting ground rules which we have used very successfully in the Polaris programme. We will be using United States' supplied handling equipment except for the large cranes used for lifting missiles and we will be using procedures which always mirror the United States' practice. We will be proving all of these procedures in exhaustive tests using inert or dummy missiles and warheads and these tests will be witnessed by independent safety authorities. Finally, we will continue to use only trained operators whose training is being regularly revalidated. If I could make the point, this approach has allowed us to conduct 2,000 movements of Polaris missiles onto and off submarines over the last twenty years without any incidents. Now, for Trident: there will be two ways, two methods, in which we could remove missiles and load missiles onto a submarine at Coulport. In the first the warheads would remain on the missile and we would remove and store them ashore as a complete assembly. The missiles will then be reloaded onto the submarine as a complete assembly with the warheads. In the second method the warheads will be removed from the missile whilst it was still in the submarine launch tube and the missile and the warheads would be moved and stored separately ashore and on re-loading the warheads would be attached to the missile after it had been loaded into the submarine launch tube. The United States' safety studies have concluded that either method is safe for service use provided that approved procedures, support equipment and properly trained personnel are used which of course we would be doing. Our own safety submission which will use data provided by the United States but will also include further studies by relevant United Kingdom authorities will provide evidence to provide the basis for approval that either method would be safe for use by the Royal Navy. In his report, I think as you acknowledged, Professor Oxburgh said that one method may not be significantly preferable to the other, but certainly the method which we do adopt for any specific missile movement at Coulport will be chosen to minimise the perceived risk in the unlikely event that there was an accident, taking into account circumstances at the time. I think again that is actually consistent with Professor Oxburgh's recommendations.

1591. That is helpful. A final point if I may, arising from Professor Oxburgh's report: I see that in paragraph 4 of his executive summary he says "A major concern over present arrangements for nuclear weapon safety is that although they are good for the evaluation of individual system elements, they are less good for viewing the safety of the system as a whole. System elements that are separately safe may interact in ways that are not easily foreseen." You can see that is not an entirely clean bill of health.

(Rear Admiral Irwin) I concede that he found areas that needed more work done and we are doing, and to a large extent have done, that work and I do not think there need to be any safety worries as a result of that.

1592. Will he be able to continue to independently review the quality of the work you are doing?

(Rear Admiral Irwin) He will indeed.

1593. And publish a report?

(Rear Admiral Irwin) Whether he would publish a report, or not, I do not know.

1594. That is up to him, is it? He is free to do that, is he?

(Mr Witney) Could I interject to say that I think the expectation is that the baton will be taken up by the champion for nuclear safety who will be established—and the Professor in his most important recommendation recommended that the MoD should establish.

Chairman

1595. I am afraid I am not clear on this: the safety champion—has he been named yet?

(Rear Admiral Irwin) No, he has not, Chairman.

Chairman: Can I ask John McWilliam to go into missile design?

Mr McWilliam

1596. Professor Oxburgh made it clear, quite bluntly, that we were buying the Trident D5 missile off the shelf from the Americans and were to take it or leave it. You now tell us "The missile would require major re-design work to accommodate a different propellant, and it would not be practicable for the United Kingdom to change the design unilaterally for the United Kingdom missiles." Does that mean your understanding is that the United States are sticking to the 1.1 rather than the 1.3 class of propellant in order to provide another 100 to 150 nautical miles range, and does it mean that if the United States does decide to enhance the safety of the propellant to 1.3 class, it would result in substantial development costs?

(Rear Admiral Irwin) The choice of 1.1 as opposed to 1.3 is to give you a more energetic propellant and that translates in operational terms into range and payload and there would be substantial disadvantages in going to a 1.3.

1597. I put it to you that "substantial" in this case is 100 to 150 nautical miles which is insignificant in the missile's maximum range?

(Rear Admiral Irwin) I do not recognise that figure, and it surprises me.

1598. Well, that is one that we have had—sorry. Cost?

(Rear Admiral Irwin) On cost we would have to follow the Americans. We could not at this stage of our knowledge of large solid-fuel rocket motors design such a thing ourselves without a very long development programme, and that would mean going back to buy from the Americans the remainder of our missiles to a different specification and then we would have to change all the present ones, so it would certainly be very expensive.

1599. And if the Americans choose, in order to comply with some of the safety recommendations and Drell, to go to the 1.3 class of propellants and sacrifice some range, or some payload, would that cost automatically reflect into any missiles we bought?

(Rear Admiral Irwin) It would definitely reflect into it because either we would have to change our buy to accord with theirs, or they would stop buying the 1.1 propellant ones and leave us as the only buyer, and that would put the cost up.

Chairman: I think, Mr McWilliam, in the light of time I am going to drop questions 11 and 12.

Mr McWilliam

1600. Could I have a quick question on 11? Can you confirm that the United Kingdom and United States' warheads are different and therefore there is no reason why we should not have different safety features from the Americans?

(Rear Admiral Irwin) I must look to the Deputy Controller Nuclear to go into the specific question, but I can certainly say they are different because we have designed a United Kingdom warhead. We have not bought or copied a United States' warhead.

(Mr Beaven) I think there were two points to your question, were there not?

1601. Yes. The second point was this: does that therefore not mean that if we wanted to we could make certain that the Trident warhead contained enhanced nuclear detonation safety devices—fire resistant pits and insensitive explosive?

(Mr Beaven) The only constraint on the United Kingdom's design of warhead relates to size and mass in terms of its performance on the United States' designed missile. The actual content and the detailed design of the warhead is a matter for the United Kingdom.

1602. Are you satisfied then that the United Kingdom design is as good as, if not better in safety standards than, the American?

(Mr Beaven) I think the Americans assess their weapons as being adequately safe and we assess our weapons as being adequately safe, using very similar criteria.

Chairman: I will ask Michael Colvin to deal with movements.

Mr Colvin

1603. Does the introduction of Trident mean any change in the frequency or procedures for movements of convoys?

(Rear Admiral Irwin) I imagine it must put the numbers of convoys up quite considerably. Could I ask Mr Witney to come in?

(Mr Witney) I am afraid I will have to be a little circumspect and unhelpful here.

1604. Could we have the answer on a classified basis perhaps?

(Mr Witney) Certainly.

1605. I gather that the Mark II heavy duty vehicles have now been introduced. They were to come in in 1992.

(Mr Witney) Yes, they are fully in service.

1606. In answer to a question about their introduction you said there had been some minor teething problems. Could you be a bit more explicit about that? Is there anything to worry about?

(Mr Witney) No, nothing to worry about—but things we wish had not happened. These vehicles were very extensively trialed before they were brought into service. I am told there were the best part of 100,000 vehicle kilometres of trial running undertaken at the development stage. There have been one or two snags since they got on to the road. I think there have only been two, possibly three, incidents classified as breakdown, a need to stop the convoy. On a couple of occasions the brakes have overheated. This transpired to be a problem of brake adjustment as between the tractor and trailer elements of the vehicle. Otherwise there have been a handful of occasions when a spurious warning light has come on and been investigated. I believe

[**Mr Colvin** *contd*]
there was an occasion when the convoy was stopped for other purposes when an oil leak was spotted—that sort of thing, very minor incidents, not a problem for the longterm but they should not be happening.

1607. What did you learn from dropping one of these vehicles on to concrete from a great height?
(Mr Witney) That they are extremely resistant to impact.[1]

1608. To that?
(Mr Witney) To that

Chairman

1609. It sounds to me, Mr Witney, as though the problem was not so much of having to stop the convoy but of being unable to stop the convoy, which is a more frightening prospect. Thank you. I would like to ask just one or two questions about works. The NAO, of course, is inquiring into the general aspect of works and costs, but I would like to put two questions specifically. The first relates to the docking facility, RD46. What did that cost and what use would it have if Trident boats are not making use of it?
(Rear Admiral Irwin) I will ask Mr Colston to tell you about cost in a moment. The use is available to Trident submarines and any other submarines for docking for as long as Rosyth continues to dock submarines. So it certainly has value.
(Mr Colston) The total estimated cost is £25 million, Chairman, which is reflected in the Trident estimate.

1610. Moving on to RD57, I believe the cost of RD57 were it not to be completed would be in the region of £500 million. Would that be correct?
(Mr Colston) That sounds, Chairman, as if it is the cost of the original RD57 proposal. There has this year, and indeed last year, been a scaling down in the element of the Trident project estimate which we attribute to the dockyard projects because there has been a scaling down of the specification for the nuclear refitting facility, as a result of our efforts to see how we could complete such a facility on a slightly simpler design and taking into account the lower numbers of nuclear submarines assumed as a result of "Defence for the 90s".

1611. A very large scaling down—I believe the new figure is somewhere in the region of £150 to £200 million.
(Mr Colston) Given that that is one of the options currently under consideration by Ministers in the context of their decision on the future location of nuclear refitting, I would wish to avoid confirming any particular cost, if I may, Chairman.

1612. Would it be fair to comment that, with the advantage of hindsight, it looks as though RD57 was a too expensive project?
(Rear Admiral Irwin) RD57 was designed when we expected to have very many more submarines than we now expect to have, so the ground rules have changed completely.

Mr Home Robertson

1613. How much has already been spent on the RD57?
(Mr Colston) Around £100 million, which would still remain valid if a scaled down version of RD57 were to be proceeded with.

Chairman

1614. Coming on to AWE finally, at Aldermaston there appears to have been an improvement in the numbers of specialists recruited and/or retained but other types of workers—supervisory, executive, industrials, craft and non-craft—have worsened. Is there still a shortfall in staff at Aldermaston?
(Mr Beaven) I think the figures are reasonably similar to the figures we gave last year. Aldermaston is quite a large organisation and there is quite a high turnover of staff, particularly over recent years, because of the number of people reaching retirement age. I think the figures perhaps reflect a natural turnover. We do not currently have a staff shortage, apart from electronic specialisms, which is a national problem rather than a specific one at AWE. Certainly the level of manpower at Aldermaston is not in any way a threat to the Trident programme.

1615. Thank you. On the subject of pay and conditions, I believe that the pay and conditions were below average for similar types of employment in that area. Is that still the case?
(Mr Beaven) We had a study carried out last year by our interim management contractor who put forward some proposals that would have represented a small increase in the level of pay at Aldermaston. Those proposals were actually put on ice because by the time the consideration was made it was getting close to the full contractorisation of Aldermaston, so no increases were made. That is not a factor which is preventing sufficient recruitment to man the programme at the moment, so pay and conditions have not been changed as a result of that.

1616. As a result of the recommendations of the Oxburgh report have any changes been made to the aims and nature of research at AWE Aldermaston?
(Mr Beaven) No. I think there is already a very strong emphasis within the research programme related to safety issues and I think Oxburgh did recognise that. That will be maintained in the future research programme but it already contains a very significant emphasis on safety issues.

1617. Hunting have now, of course, been given a full contractorisation project. Have they met the agreed objective over the last two years?
(Mr Beaven) Yes, they have.

1618. What practical difference on the ground will the change in three weeks from interim to full contractorisation make? What, if anything, will actually happen differently?

[1]Sections of the trailer, rather than a whole vehicle were drop-tested.

[**Chairman** *contd*]

(Mr Beaven) There is—a bit like a duck—a lot of running under the surface going on to achieve contractorisation. It is a legal process and there are a lot of issues that need to be addressed—I think at Aldermaston on the day very little change.

1619. Has the Compliance Office reached its agreed level of staffing?

(Mr Beaven) We have a programme for building up the Compliance Office to reach a target. That is reasonably well under way. We are still a few short, but we expect to have fully staffed the Compliance Office certainly within the first 12 months of full contractorisation.

1620. Have the full procedures been agreed and tested?

(Mr Beaven) Yes. We established the Compliance Office back in October 1990 and used the interim period when strictly the Compliance Office was not necessary fully to develop and evaluate compliance methodology. That is being done and those lessons have been introduced into the contract with Hunting-BRAE and the Compliance Office will be fully functioning from vesting day.

1621. How will the formal reviews be carried out during the seven-year contract? At what sort of period of frequency will formal review occur?

(Mr Beaven) Review is at a number of levels of the work. I personally will review the work initially once a quarter. From once every three months we may well reduce as time goes on, but the contract commits me to review the work not less than once every six months.

1622. Presumably at the end of the seven-year period there will be more reviews as you consider what to do next?

(Mr Beaven) We have committed ourselves to advising the contractor 18 months before the end of the seven-year period whether we wish to terminate the contract or recompete it or extend it. So there will be a formal review after five and a half years if I have done my arithmetic correctly.

1623. Finally, are any changes foreseen in the security management of Aldermaston?

(Mr Beaven) No. The security arrangements will remain as they are at the moment. Standards are established by the MoD who will monitor the contractor's performance in a similar way by its own security staff as it does for Aldermaston at the present time. The physical security will be maintained by the Ministry of Defence Police Guard Force in exactly the same arrangement as it does at present. There will be very few changes.

1624. It seems slightly surprising that there is no need for additional security now that it is independently contractorised but you are satisfied that it is not necessary, are you?

(Mr Beaven) I would not see that the contractorisation of Aldermaston itself should provide justification for additional security measures. We believe they are adequate as they stand, and the contractor will be asked to maintain them at that level and contractually bound to maintain them at that level.

Chairman: Thank you very much for giving us your time and for the frank way in which you have answered our questions.

WRITTEN EVIDENCE

Asterisks in the Evidence denote that a passage of Evidence has not been reported at the request of the Ministry of Defence and with the agreement of the Committee

1. Letter to the Chairman of the Committee from the Private Secretary to the Secretary of State for Defence on the revised Trident estimate, with a memorandum submitted by the Ministry of Defence on the Trident programme (21 January 1993)

The Secretary of State has asked me to let you know that he will be announcing the revised Trident estimate to the House by means of a written answer at 1530 today. A more detailed report on the Trident programme is attached for your Committee in the usual way.

REPORT ON TRIDENT BY THE MINISTRY OF DEFENCE

1. The Trident programme continues to make good progress, with substantial activity in all areas. The programme remains on time and within budget to enter service from the mid-1990s.

The Submarine Programme

2. The first Trident submarine, VANGUARD, was rolled out from Vickers Shipbuilding and Engineering Ltd's (VSEL) Devonshire Dock Hall and lowered into the water in March. VANGUARD was formally named by Her Royal Highness the Princess of Wales in April, and following further testing and final outfitting during the summer, sailed from Barrow-in-Furness for her contractor's sea trials (CSTs) in October. These trials, which have proved most successful, are now nearing completion. VANGUARD remains on course to enter service towards the end of 1994 or early in 1995. The contract to construct the fourth Vanguard class submarine (SSBN 08) was placed with VSEL in July 1992. Valued at some £550 million, the contract is at a price lower on a comparable basis than those for the first three submarines, and includes more favourable contract terms and conditions. Construction of SSBN 08, and the second and third submarines (VICTORIOUS and VIGILANT), is making good progress, with VICTORIOUS now particularly well advanced.

Strategic Weapon System

3. The Strategic Weapon System equipment on board VANGUARD continues to be tested as part of her sea trials, and installation and testing of the equipment in VICTORIOUS and VIGILANT is making good progress.

Tactical Weapon System

4. The development of the submarines' Tactical Weapons System (TWS), including Sonar 2054 and the Submarine Command System (SMCS), continues to make steady progress. Following satisfactory completion of its harbour trial in the Shore Development Facility at Barrow in August, the TWS was cleared to support VANGUARD's CSTs. The SMCS is currently using the second issue of software which meets all necessary safety and navigational requirements for VANGUARD's CSTs; further issues of SMCS software, which will have progressively enhanced functionality, will be tested and installed in the submarine in advance of VANGUARD's in-service date. The TWS production programme remains on schedule to support the submarines' deployment.

Warhead

5. Production of fissile material in existing facilities, and commissioning of new facilities, at the Atomic Weapons Establishment continues to make good progress, as does the warhead production programme. Delivery of all of the new Truck Cargo Heavy Duty Mark II vehicles was completed in November. Invitations to Tender for the AWE full management contract were issued in June; responses are currently being evaluated with a view to commencing full contractor operation of the establishment in the Spring.

Trident Works

6. Much has been achieved over the past year in preparing the Clyde Submarine Base, Faslane and the Royal Navy Armaments Depot, Coulport for the arrival of Trident. The Explosives Handling Jetty was towed from its construction site at Hunterston to Coulport in April, and is now undergoing final installation, testing, and commissioning. Significant progress is being maintained with the completion of the Shiplift. Most of the remainder of the new Trident facilities have not been handed over. We remain confident that the works programme will meet the requirements of Trident.

Jobs

7. It is assessed that on average over its total procurement period the Trident programme will provide some 6,500 direct and 5,500 indirect jobs and some 14,500 direct and 12,000 indirect jobs during the peak years of the programme (1990–93).

UK Industrial Participation in the US Trident Programme

8. By the end of September 1992, British firms had been awarded 563 contracts with a value of some $188 million. There remain opportunities for further orders during the remainder of the production phase of the programme.

Cost Estimate

9. On a non-hybrid basis, with all costs brought up to a common price base, the cost of the Trident programme is now estimated at £10,676 million. Project costs have decreased by £18 million in real terms. The following table shows the principal changes from the previous non-hybrid estimate of £10,518 million.

10. Expenditure on the Trident programme to 31 August 1992 represented some 60 per cent of the revised estimate. If this past expenditure is included at the prices and exchange rates actually incurred, the equivalent total estimate is now £9,596 million; given the percentage of the total estimate now expended this latter estimate now provides a more accurate indicator of the total programme costs. Expenditure is expected to represent about 65 per cent of the total estimate by the end of the current Financial Year.

11. The proportion of the Defence budget which the Trident programme takes over its 20 year procurement period remains at less than 2½ per cent on average.

ESTIMATE TABLE

	US £M	($M)	UK £M	TOTAL £M
Previous estimate (February 1992) @ £1 = $1.59	2,941	4,676	7,577	10,518
Real changes @ £1 = $1.59 1991-92 prices	+10	+16	−29	−18
Price inflation	+123 (4.2%)	+196	+319 (4.2%)	+441
Exchange Rate Variation	−265			−265
Revised Estimate @ £1 = $1.74 1992-93 prices	2,809	4,888	7,867	10,676
US/UK percentage	26%		74%	100%

The change in the percentage breakdown between the main cost elements are as follows:

	1992	1993
1. Submarine (less weapon systems equipment)	36%	37%
2. Weapon system equipment including Tactical Systems	20%	20%
3. Missiles	9%	9%
4. Shore construction	11%	12%
5. Warhead, miscellaneous, unallocated contingency etc	24%	22%

2. Memorandum submitted by the Ministry of Defence on Trident (8 February 1993)

The Estimate

Q1. The Committee would be grateful for an updated version of Answer 1, parts (a), (b) and (c) (including the explanation of changes) in the Ministry's Memorandum of 13 February 1992, published in the Committee's Fifth Report of Session 1991–92, HC 337, pages 25–6 (The 1992 Report).

A1.a. Programme Costs

	US	£M UK	Total
November 1981 Estimate (September 81 prices $1.78)	3,313 (44%)	4,207 (56%)	7,520
Price Inflation	1,843	4,005	5,848
Exchange Rate Variation	119	—	119
November 1981 Estimate (1992–93 prices $1.74)	5,275	8,212	13,487
Kings Bay Savings (1992–93 prices $1.74)	−323	−712	−1,035
Other Real Cost Changes (1992–93 prices $1.74)			
(1) Submarine	−228	−950	−1,177
(2) Strategic Weapon Systems (SWS) Equipment	−432	8	−423
(3) SWS Missiles	−739	−42	−781
(4) Tactical Weapon Systems (TWS)	2	310	312
(5) Shore Construction (excluding Dockyard Projects)	—	761	761
(6) Dockyard Projects & Functional Machinery	—	36	36
(7) Warhead, Miscellaneous & Unallocated Contingency	−745	244	−502
Current Estimate (92–93 prices $1.74)	2,809 (26%)	7,867 (74%)	10,676

Note:
1. Costs are non-hybrid. Figures rounded to nearest £ million, hence any apparent imbalances.

b. Breakdown of costs

	Nov 1981 Estimate (£M) Sept 81 prices $1.78			1981 Estimate (£M) 92–93 prices $1.74 (Note 2)			Current Estimate (£M) 92–93 prices $1.74 (Note 2)		
	US	UK	Total	US	UK	Total	US	UK	Total
Submarines	267	2,333	2,600	422	4,716	5,138	194	3,766	3,961
SWS Eqpt	918	74	992	1,429	134	1,563	997	143	1,140
SWS Missile	1,275	44	1,319	1,704	40	1,744	965	—	965
Tactical Weapon System	—	326	326	—	643	643	2	953	954
Shore Construction	—	579	579	—	506	506	—	1,267	1,267
Dockyard Projects & Functional Machinery	—	—	—	—	86	86	—	123	123
Warhead, Miscellaneous & Unallocated Contingency	853	851	1,704	1,396	1,374	2,770	651	1,618	2,268
Totals	3,313 (44%)	4,207 (56%)	7,520	4,951 (40%)	7,499 (60%)	12,450	2,809 (26%)	7,867 (74%)	10,676

Notes:
1. All figures are non-hybrid and rounded to nearest £ million, hence any apparent imbalances.
2. The 1981 estimate (92–93 prices $1.74) and the current estimate are presented net of savings resulting from the decision to process missiles at Kings Bay.

Explanation of Changes (Totals)

	£M		
	US	UK	Total
November 1981 Estimate (September 81 prices $1.78)	3,313	4,207	7,520
Price Inflation	1,843	4,005	5,848
Exchange Rate Variation	119	—	119
Kings Bay Changes	−323	−712	−1,035
Cost Changes	−2,142	367	−1,776
Current Estimate (92–93 prices $1.74)	2,809	7,867	10,676

Note:
Figures are rounded to nearest £ million, hence any apparent imbalances.

c. Effect of exchange rate variations (non-hybrid estimates)

	1981 Estimates £M (dollar content of $8,615M at current price levels)			Current Estimate £M (dollar content of $4,888M at current price levels)		
	US	UK	Total	US	UK	Total
1. $1/£1	8,615	7,499	16,114	4,888	7,867	12,755
2. $1.25/£1	6,892	7,499	14,391	3,910	7,867	11,777
3. $1.50/£1	5,743	7,499	13,242	3,258	7,867	11,125
4. $1.74/£1	4,951	7,499	12,450	2,809	7,867	10,676
5. $2/£1	4,307	7,499	11,806	2,444	7,867	10,311

Estimates are net of savings resulting from the decision to process missiles at Kings Bay.

Q2. How much has been (a) spent and (b) committed on Trident in (i) the UK and (ii) the US, up to the latest available date?

A2. a. Expenditure on Trident up to November 1992 is:

(a) £4,430 million in UK.

(b) £1,448 million in US.

b. Commitment on Trident up to November 1992 is:

(a) £5,752 million in UK.

(b) £2,038 million in US.

Note:
All figures are hybrid.

Q3. The Committee would be grateful for an updated version of the information given in Answers 3 to 9 on pages 26–7 of the 1992 Report.

A3.a. A summary of gross increases and reductions in real costs for the UK and US parts of the programme are as follows:

	£M 1991–92 prices $1.59		
	US	UK	Total
Submarines	−5	7	2
SWS Equipment	13	−2	10
SWS Missile	26	0	26
TWS	−1	22	21
Shore Construction (excluding Dockyard Projects)	0	45	45
Dockyard Projects & Functional Machinery	0	−20	−20
Warhead, Miscellaneous & Unallocated Contingency	−22	−80	−103
Totals	10	−29	−18

Note:
All figures are hybrid estimates rounded to nearest £ million, hence any apparent imbalances.

A3.b. The actual expenditure on Trident and Polaris for 1991–92 and the estimated expenditure for 1992–93 is as follows:

	£M	
	1991–92	1992–93
Trident	1,176	1,052
Polaris	164	180

Note:
The Trident expenditure figures include running costs.

A3.c. * * *

A3.d. Expenditure on the four Vanguard class submarines to December 1992 at hybrid prices is as follows:

	£M
SSBN 05	1,011
SSBN 06	472
SSBN 07	391
SSBN 08	193

A3.e. Contingencies included within each programme element at 92–93 prices and $1.74 are as follows (last year's figures at 91–92 prices and $1.59 in brackets):

		£M	(£M)
(a)	Submarine	84	(112)
(b)	Strategic Weapon System	22	(39)
(c)	Tactical Weapon System	—	(2)
(d)	Shore Construction (Excluding Dockyard Projects)	28	(44)
(e)	Dockyard Projects & Functional Machinery	6	(13)
(f)	Warhead, Miscellaneous and Unallocated Contingency (of which Unallocated Contingency is £276M (£356M))	279	(360)

A3.f. The phasing of Trident expenditure by period (lines (a) and (b) at hybrid prices, and lines (c) and (d) at 1992–93 prices and $1.74) is as follows:

		£M	
		UK	US
(a)	1980–81 to 1984–85	174	176
(b)	1985–86 to 1989–90	2,187	637
(c)	1990–91 to 1994–95	3,409	1,235
(d)	1995–96 onwards	1,085	692

Note:
These total to the hybrid project total estimate of £9,596 million. Figures rounded to nearest £ million.

A3.g. Forecast expenditure for 1993–94 and 1994–95 at 1992-93 prices and $1.74 is as follows:

(a)	1993–94	£880 million
(b)	1994–95	£587 million

Q4. The Committee would be assisted by an approximate figure for the lifetime costs of the Trident programme, including refits and the costs of AWE attributable to Trident over the lifetime of the programme.

A4. Although any estimate can only be approximate at this stage, we currently assess that the operating costs of Trident over its lifetime are likely to be in the order of £5½ billion. This is in addition to the cost of procuring the Trident system as outlined in Question 1.

Submarines

Q5.a. What is the state of progress on each of the four VANGUARD class submarines?

Q5.b. What were the results of VANGUARD' s Contractor's Sea Trials, and what significant problems were encountered? What was the nature and gravity of the fault allegedly discovered in October prior to her departure from Barrow? Will RN contract acceptance trials take place as foreseen in evidence last year (Q2082)?

Q5.c. What were the significant improvements achieved in the July 1992 order for SSBN 08? How much has been spent on long lead funding at the time of the order, and what percentage of the final price did this represent?

A5.a. SSBN 05 (VANGUARD) continues to make good progress, and remains on schedule to meet her planned in-service date. Following the completion of her contractor's sea trials, VANGUARD returned to Barrow-in-Furness on 23 January and as planned is undergoing final work by the contractor prior to acceptance by the Royal Navy later this year. Outfitting and installation of equipments and systems in SSBN 06 (VICTORIOUS) is nearing completion and testing is well advanced. The submarine is planned to be rolled-out of the Devonshire Dock Hall in late summer. Steady progress with the construction of SSBN 07 (VIGILANT) continues. The hull is now complete, but in two sections, and all sixteen missile tubes have been installed. Good progress has been made with the installation of cabling and equipments. Following the placing of the contract for SSBN 08 last July, the first hull unit has been transferred to the Devonshire Dock Hall and good progress is being made with steelwork and fabrication of sub-assemblies. The Minister for Defence Procurement presided at SSBN 08's keel laying ceremony on 1 February 1993.

A5.b. VANGUARD' s Contractor's Sea Trials started in October 1992 and proved to be most satisfactory, validating the integrity of the design of the Vanguard class submarine. Surface and diving trials, including the deep dive, were successfully completed and all of the vessel's major equipments performed well. As was expected at this stage of the programme, the trials did reveal some minor teething problems, which for the most part were resolved by contractors' staff during the trials. Prior to VANGUARD's departure from Barrow-in-Furness, incomplete documentation was identified relating to the non-destructive testing of the reactor system during a quality assurance audit. Following a thorough investigation, the matter was resolved to the complete satisfaction of the safety authorities and the Ministry of Defence. We would like to assure the Committee that there was no question of sending VANGUARD to sea in an unsafe condition. VANGUARD's Royal Navy contract acceptance trials are now planned to begin in the second half of this year.

A5.c. The contract for SSBN 08 consolidates the achievements of the SSBN 07 negotiations, notably the transfer to the contractor of the risks relating to industrial action, and improved productivity rates through a reduction of labour hours. It also provides incentives on VSEL to reduce its overhead rates and reflects improvements in quality of pricing by expanding the scope of the contract and subjecting the remaining areas of work to maximum prices. About £169 million had been spent on long lead funding at the time of placing the order for SSBN 08. This represented some 30 per cent of the contract value.

Tactical Weapon System

Q6.a. What progress has been made in resolving the outstanding problems with the Tactical Weapons System described by the Committee in para 40 of the 1992 Report, and referred to in para 15 of the Government's Reply? What is the remaining element of risk in the programme?

Q6.b. Has software been provided in phases for (i) Contractor's Sea Trials and (ii) RN contract acceptance trials?

Q6.c. What is the lead time between SDF and VANGUARD trials of the TWS, and when did full Harbour Trials take place in each case?

Q6.d. What is the latest situation with regard to slippage in the Sonar 2054 development contract?

Q6.e. What recent difficulties have been encountered with respect to the periscope?

A6.a. Good progress has been made in resolving outstanding problems with the Tactical Weapon System over the last year. All significant milestones have been met including the requirement to support VANGUARD's contractor's sea trials. The software to enable the Submarine Command System (SMCS) to support contractor's sea trials was delivered in May 1992, and after proving in the Shore Development Facility at Barrow, has been used to good effect at sea in VANGUARD. The remaining issues of SMCS software remain on schedule. The programme is tight but remains achievable. The first issue of operational software for Sonar 2054 has satisfactorily supported contractor's sea trials. With the exception of the Towed Array which will be tested later in the programme, contractor's sea trials of all Sonar 2054 equipments have been satisfactorily completed. The development and testing of subsequent issues of Sonar 2054 software is progressing.

A6.b. Software issues to support the Tactical weapon System during contractor's sea trials were provided according to the schedule advised to the Committee last year, having been tested in advance. Subsequent issues of software will be provided in phases to meet the programme for acceptance by the Royal Navy.

A6.c. Testing of Tactical Weapons equipments in the Shore Development Facility over the last year has, as expected, continued to reveal minor deficiencies. The additional time required to resolve these has meant that for some elements of the testing programme there is now a short overlap between the completion of testing in the Shore Development Facility and the start of equivalent testing in VANGUARD. However, other lead times remain well over a month. The harbour trials of the Tactical Weapon System in the Shore Development Facility and in VANGUARD using existing versions of software were completed in July 1992 and August 1992 respectively.

A6.d. There has been no further slippage since our last report to the Committee.

A6.e. VANGUARD's contractor's sea trials revealed a number of difficulties with the electronic systems within the Self Protection Mast (SPM) periscopes. Although the performance of the SPM's optical components and its ability to support safe navigation is not in question, a detailed review of the deficiencies with the electronic elements of the SPM is underway to establish an appropriate technical and cost effective solution.

Strategic Weapon System

Q7.a. Are further missiles to be purchased from the United States in Fiscal Year 1993?

Q7.b. What level of funding has the US Congress authorised for the Trident D5 missile programme for FY93 ?

A7.a. 18 missiles were ordered by the UK in October 1992 as part of the joint US/UK missile order for US Fiscal Year 1993.

A7.b. The US Congress granted some $987 million for the procurement of 21 Trident D5 missiles and related costs for Fiscal Year 1993.

Q8. What nuclear tests have been conducted on behalf of HMG during 1992?

A8. None.

Q9. Has AWE made its first scheduled delivery of warheads?

A9. Ye. Deliveries remain on schedule to meet the needs of the Trident programme.

Q10.a. The Committee has asked for the full classified version of the Chief Scientific Adviser's Report on nuclear weapon safety.

Q10.b. What studies are continuing into Trident warhead safety, including missile loading and unloading (4.4.3 of the Report), and at what point will a definitive expression of confidence in one-point safety of the device be feasible?

Q10.c. To what extent does the Trident warhead contain Enhanced Nuclear Detonation Safety (ENDS) devices, and fire-resistant pits? Is there any technical reason why the UK warhead should not incorporate Insensitive High Explosive (IHE); or why 1.3 class missile propellant should not be used in D5 missiles? To what extent does Professor Oxburgh's observation in para 4.4.3 that "We are buying the Trident missile off the shelf from the US and unless the US decide to modify their system our only choices are to use it as it is, or not to let it enter service" apply to these matters?

Q10.d. What progress has been made in implementing the recommendation for a nuclear weapon safety champion and a Nuclear Weapon safety Group, summarised in 3.3.5 of the Report?

Q10.e. What are the implications for the forward programme of safety testing of the limitation to one UK nuclear test a year from 1993 to 1996 in the United States?

Q10.f. Will there be any changes to the frequency or procedures used by nuclear weapon convoys as a result of the entry into service of Trident warheads? What has been the performance record to date of the new Truck Cargo Heavy Duty Mark II vehicles? When will all eight be fully in service?

A10.a. Successive Governments have always declined to release, even on a classified basis, information concerning the design of UK nuclear weapons. Accordingly, the MoD regrets that it is unable to help the Committee further on this issue. In publishing the Working Group's report, the Government's objective was to keep to a bare minimum the material withheld for reasons of national security. These excisions do not interfere with a proper understanding of the report and its conclusions.

A10.b. All aspects of Trident nuclear weapon safety, including missile handling procedures, are being examined as part of our overall assessment of Trident safety. As the Committee has been advised in the past, nuclear weapon safety will be reviewed continually throughout the life of the Trident system, and the Trident system will not be allowed to enter service until the Government and its independent safety advisers have been satisfied that the safety case and its assessment has been completed. The Committee can be assured that our Trident warheads have now been definitively assessed to be one-point safe.

A10.c. With regard to the design of the warhead, it has been the long-standing practice, for reasons of national security, not to reveal details of warhead design. We can therefore make no statement on whether the UK's Trident warhead design incorporates one or all the safety features referred to by Drell as ENDS, FRP or IHE.

Professor Oxburgh's statement on Trident D5 missiles in paragraph 4.4.3 of the report is correct. The missiles have been designed by, and are being manufactured in, the US, and the UK will use missiles drawn from a common pool located at Kings Bay. The missile would require major redesign work to accommodate a different propellant, and it would not be practicable for the UK to seek to change the design unilaterally for UK missiles.

More generally, the Oxburgh report observed that the Trident system is either safer than Chevaline or of comparable safety, and that the UK Trident warhead has more advanced safety features. Subject to the satisfactory completion of the full UK safety case, the review group saw no reason to suggest that Trident should not be accepted into service.

A10.d. The nuclear weapon safety champion will be responsible to the Chief Scientific Adviser and will be supported by the Nuclear Weapon Safety Group. A Grade 5 has been appointed as Head of the Safety Group, and the selection of the safety champion is expected early this year; the safety group will be gradually built up to full strength thereafter.

A10.e. The established rate of underground nuclear testing by the UK has been, on average, less than one test a year. Even before the recent US legislation we had no plans to increase that rate. The numerical limitation over the period 1993-96 will not therefore inhibit earlier plans.

A10.f. To preserve the security of nuclear weapons movements, it has been our longstanding practice not to reveal details of the frequency and procedures of nuclear weapon convoys. All eight Truck Cargo Heavy Duty (TCHD) Mark II vehicles are now in service. Despite some minor teething problems, the new vehicles represent a significant improvement in mechanical reliability over the older Mark I vehicle.

Polaris

Q11. The Committee wishes to know when HMS RENOWN returned to full operations; for how long the deterrent patrol was maintained by HMS REPULSE and HMS RESOLUTION alone; and what lessons have been drawn from this for the operation of Vanguard class boats?

A11. HMS REVENGE completed her final deterrent patrol in April 1992, since when patrols have been maintained by HMS REPULSE and HMS RESOLUTION. HMS RENOWN completed her refit in November 1992 and following the completion of her current work up trials is * * * The experience of operating the Polaris force has illustrated that it would not have been possible to maintain continuous patrols with a three boat force over the life of the system, and has accordingly reinforced the requirement for a four boat Trident force.

Works

Q12. The Committee would be grateful for an updated version of the figures for individual construction programmes and attribution to Trident given in Answer 22, page 30 of the 1992 Report; for a note on large contracts let in the past year; and for a progress report on the principal Trident works projects, including RD46 and RD57. It has also asked for a progress report on consideration of the extent to which the close-wrap technique will prove an adequate longer-term solution for demagnetising submarines.

A12.a. Estimates for individual construction programmes and attribution to Trident can be broken down as follows:

		£M	
		Related	Attributable
a.	Coulport	550	549
b.	Faslane	654	210
c.	Clyde Submarine Base Externals (Roads and Utilities)	63	60
d.	Rosyth	202	47
e.	Elsewhere	20	17
Totals		1,489	883

Notes:

a. The estimates are shown on a hybrid basis ie the expenditure prior to 1992–93 is at historical prices; 1992–93 and future costs are at current (1992-93) prices.

b. To the figure of £883 million must be added contingencies (£34 million) and resource costs (£245 million), £186 million price variation on sunk costs, and £42 million for functional machinery in order to arrive at the total of £1,390 million, which reflects the provision for shore construction, dockyard projects and functional machinery as set out in the answer to Question 1(b).

A12.b. No contracts with a value of over £5 million have been placed in the last year.

A12.c. Good progress has been made with the Trident works programme at the Clyde Submarine Base at Faslane and Coulport. The shiplift is now virtually complete, with installation of the doors well underway, the overhead cranes substantially complete, and installation and testing of the syncrolift platform and mechanisms going well; the platform was moved for the first time last July. Following the satisfactory completion of all contract work, the Finger Jetty was handed over to the Clyde Submarine Base in September 1992, although in order to complete finishing works cost effectively and in the time required, a small package of essential additional works was let last November. Both the 125 tonne and 20 tonne cranes have been erected on the jetty, and commissioning is well underway. The Faslane Northern Utilities Building was handed over in October 1992, and following intensive training for the operational staff, the Clyde Submarine Base assumed full responsibility for the facility in December.

At Coulport, the Explosives Handling Jetty was successfully floated and towed from Hunterston to Coulport in April 1992. Construction of this facility is virtually complete, with installation, testing and commissioning of the Mechanical and Electrical systems progressing well; the facility will be handed over to the MoD in March. The Coulport Generating Station was successfully handed over in July 1992, and operational proving and safety and availability related work has been completed. The Jetty Access Roads and Support Area and Explosives Area Main Works packages were completed in July and August 1992 respectively. In order to guard against potential conflicts of interest with Tarmac Construction plc as the main contractor for these projects and the new owner of the MoD's project managers (PSA Projects Ltd), MoD assumed direct project management responsibility for these contracts in December 1992.

At Rosyth, the Docking Facility (RD46) was handed over to Rosyth Royal Dockyard last November, and enabling work on the Nuclear Refuelling and Refitting Facility (RD57) has continued pending an announcement on the venue for the future refit of nuclear submarines.

A12.d. The programme to set up an interim close-wrap deperming facility for the Vanguard class submarines is continuing to schedule. The design work has largely established the practicability of the close-wrap technique as a possible long term solution. However, a final decision is not likely to be made until the mid-1990s, in the light of experience that will have been gained with the operation of the interim facility, and of work on the frequency of treatment required by submarines to maintain acceptably low magnetic signatures.

Q13. What are the current shortfalls of staff at AWE Aldermaston, Burghfield and Cardiff in each of the following categories:

- *Supervisory, Administrative, Executive and Clerical Grades;*
- *Specialists;*
- *Industrials, Craft;*
- *Industrials, Non-craft?*

Which skills and trades are particularly affected? Have there been any significant changes in the past year in the pay and allowances of staff at AWE?

A13. Recruitment activity is continuing in order to provide the Atomic Weapons Establishment with the correct mix of skills and to offset natural wastage, but no increase in overall numbers is envisaged. Current shortfalls for Aldermaston, Burghfield, and Cardiff are as follows:

	Aldermaston	Burghfield	Cardiff
Supervisory/AEC	28	8	2
Specialists	100	12	1
Craft Industrials	19	6	0
Non-Craft Industrials	21	5	1

The most difficult group currently to recruit is electronic specialists.

There have been no significant changes in the pay and allowances of staff at AWE in the past year, except those arising from general Civil Service changes.

Q14.a. Professor Oxburgh recommended a vigorous research programme at AWE on continuing improvements in the safety of warhead design, and warned that "MoD will have to be more than usually sophisticated in ensuring that AWE is appropriately tasked and adequately resourced" [3.81-2]. What steps have been taken in response to these conclusions? What has been the proportion of the AWE operating budget devoted to warhead safety over the past five years; what are the plans for future years as contained in the management contract; and who is the "customer" within MoD who will set out the nuclear safety research programme?

b. What response has been made to the recommendation on levels of experience and training of MoD nuclear safety posts in para 3.2.5 of Professor Oxburgh's report? What steps have been taken to ensure that the contractorisation of AWE is not allowed to reduce the availability of nuclear expertise to MoD, as set out in para 3.8.4 of his report?

A14.a. The AWE research programme covers a wide range of technologies relating to the design and construction of nuclear warheads. Most of these activities have a bearing on safety, with some directed primarily towards objectives where safety is the dominant concern. Accordingly, it has not been possible to identify the proportion of the AWE operating budget which is devoted solely to warhead safety.

All recent nuclear underground tests have had a strong safety focus and have made a large contribution towards developing and confirming safety aspects of the nuclear programme. Tasking of all elements of the research programme is being radically strengthened and formalised in light of the forthcoming full contractorisation of the establishment. Following Vesting Day, MoD research requirements will be specified in a number of project contracts placed with the successful Phase 2 operating contractor.

The MoD's requirements relating to research are drawn up by the Assistant Chief Scientific Adviser (Nuclear), who will consult closely the nuclear safety champion when he or she is appointed.

A14.b.i. The recommendation in paragraph 3.2.5 of the Oxburgh Report arose from the Working Group's perception that certain key administrative posts lacked some experience in nuclear safety matters. Accordingly, provision is now being been made to give current job holders and incumbents suitable training at AWE, by the Services, or by attendance at relevant courses. It will be an ongoing responsibility of line management to ensure that the requirements referred to in the Oxburgh recommendation are satisfied. Additionally, amongst their various duties, the safety champion and the Nuclear Weapon Safety Group will be responsible for monitoring the level of experience and training of key nuclear safety post holders.

A14.b.ii. In the early stages of the development of proposals for the contractorisation of AWE, and well before the publication of Professor Oxburgh's report, it was recognised that the new arrangements must not significantly reduce the availability of nuclear expertise to MoD. Accordingly, the Term Contract for full contractorisation contains provisions for both the training of MoD staff at AWE and for the secondment, under standard MoD arrangements, of selected staff, both to and from AWE, to ensure that the present position is not weakened.

Q15. The Committee has requested a further report on the progress of the interim management contract between MoD and Hunting-BRAE Ltd; a note on the conduct and outcome of the tendering exercise; and seeks a copy of those parts of the Phase 2 contract relating to research.

A15. The Phase 1 Interim Management Contractor has continued to meet the retired safety and security standards and has achieved its programme commitment for both in-service and Trident warhead requirements. Additionally, significant progress has been made in a number of areas considered fundamental to Phase 2 operations. These include the definition and introduction of a new accounting system, the formalisation and registration of enhanced quality control systems, the implementation of the Research Management Plan which provides improved definition and review of the research programme, the introduction of a comprehensive safety development programme, and further developments aimed at improving communication at all levels.

In response to the Invitation to Tender and draft Term Contract issued last June, three bids were received in September 1992 from Babcock NNC Ltd, Hunting-BRAE Ltd, and Rolls Royce Ordnance Ltd. Following the formal presentation of the tenders to MoD later that month, detailed evaluation commenced with evaluation groups covering major functional areas. Assessment of the bids has now been completed, and the successful contractor, Hunting-BRAE Ltd, was announced on 4 February. Hunting BRAE Ltd offered the best overall package in response to MoD's stringent requirements and criteria for operating the Establishment, including those relating to safety and security. The contract will be for a seven year period. Work continues towards a smooth transition to full contractor operation on 1 April 1993.

Other contractorisation related issues which have been progressed include the formation (and formal incorporation during November 1992) of the employing company, Atomic Weapons Establishment plc, the laying of the Statutory Instrument in November 1992 to give effect to the provisions of the AWE Act 1991, and the development of new pensions and redundancy schemes to replace existing Civil Service arrangements.

Detailed provisions for the definition, monitoring and review of the research programme under Phase 2 arrangements will be a major feature of the Project Contracts to be agreed with the successful Phase 2 contractor. These Project Contracts will operate under the umbrella of the Term Contract and will be the mechanism for ensuring that the programme required by MoD to be carried out by the contractor is properly defined, managed, reviewed and assessed. The current (draft) Term Contract outlines these requirements and emphasises the fundamental importance of the research programme to the underpinning of existing and future systems as well as providing the foundation of the UK's nuclear warhead deterrent capability. The appropriate extract from the draft Term Contract is forwarded to the Committee on a classified basis.

* * *

3. Extract from "The Safety of UK Nuclear Weapons"—Report of the review conducted by a working group led by the MoD's Scientific Adviser (July 1992)

Executive summary

1. This report is the work of a Group set up in mid–1991 by the Secretary of State for Defence "to review in the light of any relevant aspects of the report of the Drell Panel in the United States the safety of the present and prospective United Kingdom nuclear armoury".

2. The procedures for ensuring the safety of the UK nuclear stockpile are numerous and complex. The Group has reviewed the present procedures to the extent possible within the time available, and has concluded that overall they have been effective, well implemented and rigorously inspected. But they are difficult to view as a whole. There is no single coordinating body, and different parts have evolved separately over the years and involved many different organisations. The complexity results in part from successive reorganisations that have not primarily been concerned with safety, and in part from the security that attends all nuclear activities with the associated difficulty of gaining an overview. The organisation has depended on the experienced staff in post who know what has to be done.

3. The New Management Strategy in MoD provides the opportunity to make all responsibilities, including those for safety, clearer. Chains of safety responsibility should be as short as possible—at present they tend to be over-long with little added value in certain parts of the chain. We recommend all nuclear weapon safety responsibilities be specifically delegated by personal letter.

4. A major concern over present arrangements for nuclear weapon safety is that although they are good for the evaluation of individual system elements, they are less good for viewing the safety of the system as a whole. System elements that are separately safe may interact in ways not easily foreseen (eg in the case of Trident the whole system comprises warhead, missile, submarine reactor, torpedoes, shore facilities, etc). Overview of the whole system is difficult but essential and is made more difficult if staff are inexperienced or spend too short a time in post. An overview must be maintained by individuals with appropriate technical understanding rather than by briefed officials, whether they be administrators, scientists or from the Services.

5. We therefore recommend the appointment of an independent champion for nuclear weapon system safety in MoD who, supported by an appropriate staff, would personally answer for a range of assessment and overview responsibilities with respect to the safety of nuclear weapon systems. This would in no way dilute the responsibility of the Procurement Executive for ensuring that all issues of nuclear safety were addressed, nor the duties of the Ordnance Board, particularly with respect to design assessment. Where the champion and his staff might be best located within the MoD structure would be for the Department to decide, but independence and, ultimately, access to Ministers would be essential.

6. The existing Nuclear Weapons Safety Committee (NWSC) is independent and comprises outside experts with relevant experience. It is free to inquire into any aspect of nuclear weapon safety. It may also respond to requests for advice. The chairman has direct access to the Secretary of State on any matter that he deems necessary. This committee is outside the chain of safety responsibility and it is important that it should remain so. We recommend, however, that arrangements for bringing matters to the attention of the NWSC be reviewed.

7. The weapons in the UK stockpile (the WE177 free-fall bomb and the Polaris-Chevaline missile system) are of elderly but robust design. The present review has not revealed previously unsuspected weapon hazards nor suggested that present handling methods should be modified. There is no reason not to allow the WE177 to continue in service in accordance with present plans, subject to its satisfying periodic system safety reviews as we recommend should be regular practice with nuclear weapon systems.

8. The Polaris-Chevaline system currently deployed in submarines is due to be replaced by Trident. Although the Trident warhead has additional safety features, the overall system safety is in part dependent on the Trident missile itself which is procured from the US. As the Drell report recognised, the most delicate operation is weapon embarkation and disembarkation and much effort has gone into making this operation as safe as possible. Although UK proposed practice is in fact the method preferred by Drell, we recommend that the arrangements for conducting the operation continue to be studied.

9. Given the limited remaining life of the Polaris system, if the UK wishes to retain a strategic nuclear capability, Trident offers a way of doing so with safety levels that are comparable to and in some ways higher than those of Polaris. On these terms, and provided that a full UK safety case is satisfactorily completed, we see no reason to suggest that Trident should not be accepted into service.

10. It is planned to replace WE177 early in the next century, and to meet this date preliminary work is already under way on a future nuclear weapon. It is essential that safety issues be fully exposed during the process of specifying this requirement. We recommend that the Ordnance Board revisit its guidelines for the safety assessment of nuclear weapons in time for its views to be taken into account.

11. We recommend that a strategy for safety justification of any future nuclear weapons should be planned at the outset. This is particularly important if the vehicle is to be procured off-shore. The strategy should specify any needs for the release of test data, if necessary to be written into contracts, so that a satisfactorily independent and fully validated UK safety assessment is achievable.

12. Warheads are carried by road in vehicles that are secure and equipped with satisfactory means of internal containment and protection. The present vehicles themselves, however, are old, unreliable and overdue for replacement. Although this does not add significantly to the hazards of transport, even rare breakdowns in this most conspicuous part of UK nuclear activities can only undermine public confidence in what are otherwise thoroughly professionally run operations. New vehicles are planned to enter service in 1992.

13. We recommend that clear criteria be set for the reporting of incidents involving any part of a nuclear weapon system which affects nuclear weapon safety, and that the list of reported incidents be reviewed annually with a view to recognising any lessons that may be learned and bringing them to the attention of the appropriate authorities.

14. The Atomic Weapons Establishment (AWE) is the sole source of UK expertise in warhead design and the prediction of warhead behaviour in all environments. The past safety of the UK nuclear programme has been dependent in large measure on the ability of AWE to be proactive as well as reactive, and to collaborate closely with those who handle weapons and are responsible for their custody. AWE staff have also customarily filled nuclear posts in MoD. Although some suitable staff might be recruited from elsewhere, we recommend that the impending contractorisation of AWE should not be allowed to impede these activities.

15. It has been customary to consult AWE on all matters bearing on warhead safety. Because the procedures that are safe with nuclear weapons may in some cases be counter-intuitive to conventional weapons experience, we recommend that there should be an obligation to consult AWE over the planning or modification of all procedures relating to the handling, storage, or movement of nuclear weapons.

16. The UK nuclear weapon programme has been conducted so far without any major incident. This record is a tribute to the efforts of all those involved over the years but offers no grounds for complacency. However unlikely an accident may be, we recommend that as long as the country retains nuclear weapons, high priority continue to be given to the retention of properly trained, equipped and regularly exercised nuclear accident response teams.

17. The safe and responsible ownership of nuclear weapons carries major obligations. It is possible to discharge these only with the support of comprehensive technical expertise of the highest quality and operating procedures that are carefully planned and meticulously executed. We recommend that technical expertise be sustained by a vigorous programme of research at AWE that includes a sharp focus on safety. If underground testing is constrained this process will be more difficult. The achievement of safe operation will in any case depend on the Services maintaining their present high standards.

18. We have analysed the specific recommendations made by the Drell panel and considered their relevance to UK weapons and practices. Most matters are addressed in the main report but, for completeness, a separate section commenting on each of the Drell recommendations is included.

19. Even as this report was being written major changes were taking place in the nuclear plans of the superpowers. Nevertheless the Group believe that their comments and recommendations on the issues they were asked to consider can be read across to any new nuclear posture that the UK may decide to adopt.

20. The Group records its thanks to all who have assisted in the enquiry. The fullest cooperation and attention was received from all of whom it was sought.

Recommendations

1. That more formal arrangements for bringing matters to the attention of the Nuclear Weapons Safety Committee be considered. (Paragraph 2.4.3)

2. That consideration be given to the involvement of UK nuclear weapons design authorities in Weapon Standardisation Team Inspections, Nuclear Weapon Capability Inspections and Missile Technical Proficiency Inspections. (Paragraph 2.5.6)

3. That all those with nuclear responsibilities should review their delegations under the New Management Strategy, to make sure that responsibilities for both promoting and ensuring safety are explicitly stated and acknowledged. (Paragraph 3.2.2)

4. That senior MoD managers ensure that professional views from those with the highest level of technical overview are properly represented, together with the wider view of management in the area concerned. The senior MoD managers should also maintain sufficient direct links with the technical level to satisfy themselves that the procedures are sound. (Paragraph 3.2.4)

5. That arrangements be instituted to define the levels of experience and training that should be associated with all posts in MoD having responsibilities for nuclear weapon safety, and to ensure that these requirements can be and are satisfied. (Paragraph 3.2.5)

6. That MoD should identify a champion for nuclear weapon safety. This individual would need to have the competence, resources and seniority to discharge the following responsibilities:

— to be the independent champion for safety in nuclear procurements who would be involved in nuclear procurements from the earliest stages and who could, if necessary, raise to Ministerial level any conflict between safety and cost, performance or timescale;

— to provide an independent assessment of the completeness and quality of the safety case prepared for any nuclear weapon system, and to promote best practice in this area;

— to keep continuously under review the organisation and management of nuclear weapon safety in all procedures and activities related to present or future nuclear weapon systems, to be satisfied that they are functioning effectively, and to bring to the attention of the responsible authorities any deficiencies or unnecessary duplications;

— to set criteria for the reporting of incidents actually or potentially hazardous to nuclear weapon systems or their critical components, and to receive, maintain, analyse and appropriately disseminate records of such incidents;

— to serve as a centre of experience and best practice in safety matters relating to the ownership of nuclear weapons;

— to interact with appropriate technical organisations in the formulation of nuclear safety R&D objectives;

— to provide to the EPC(N) and EPC or their successor bodies, assessments of the treatment of system safety in submissions relating to nuclear weapons, and similarly to the other approving bodies or individuals for items too small to be considered by the senior committees.

(Paragraph 3.3.5)

7. That MoD committees with nuclear weapon safety responsibilities should review their roles, and that the way in which they reach and communicate decisions, and the responsibilities of the chairman, should be agreed by the members and those to whom advice or direction is normally offered. (Paragraph 3.4.1)

8. That as long as the country retains nuclear weapons, high priority continue to be given to the retention of properly trained, equipped and regularly exercised nuclear accident response teams. (Paragraph 3.6.4)

9. That the potential linkage of security to nuclear weapon safety be recognised by requiring the Director of Nuclear Policy and Security to report any proposed change in the physical or technical security measures to be applied to an operational nuclear weapon system, whether or not it was yet in operational service, to the relevant procurement authority. The procurement authority, whether for the warhead or the overall system, should conduct a formal assessment of the nuclear safety implications of the proposed change. (Paragraph 3.7.2)

10. That a vigorous research programme be pursued at AWE towards continuing improvements in the safety of warhead designs. (Paragraph 3.8.1)

11. That steps be taken to ensure that AWE be consulted over the planning or modification of all procedures relating to the handling, storage, or movement of nuclear weapons. (Paragraph 3.8.3)

12. That the contractorisation of AWE not be allowed to reduce the availability of nuclear expertise to MoD. (Paragraph 3.8.4)

13. That comprehensive assessment methodologies such as those based on the use of probabilistic design criteria continue to be actively pursued for application to the design of nuclear weapon systems. (Paragraph 4.1.3)

14. That approximately every seven years during service there should be a design review of a nuclear weapon system. (Paragraph 4.2.2)

15. That a design review of the WE177 weapon should be undertaken forthwith, not because we have identified any specific cause for concern, but as a prudent precaution. (Paragraph 4.2.2)

16. That weapons continue to be transported by air as infrequently as possible. (Paragraph 4.2.4)

17. That if it is the intention that surface ships should remain nuclear capable after the withdrawal of the WE177 from deployment at sea, then there should be a safety requirement to ensure that the capabilities of ships and shore facilities are maintained by exercising with training rounds. (Paragraph 4.2.5)

18. That studies continue in order to further understanding of the potential hazard of Trident missile loading and unloading, and to ensure that it is minimised in every situation. (Paragraph 4.4.3)

19. That the Ordnance Board revisit its guidelines for nuclear weapon design assessment, on a regular basis, recognising that it is essential that this be done before any new weapon procurement is embarked upon. (Paragraph 4.5.2)

20. That a strategy for the safety justification of any future nuclear weapon system be defined. (Paragraph 4.5.4)

4. Extract from a letter to the Clerk of the Committee from the Private Secretary to the Secretary of State for Defence on reportable accidents and incidents at AWE Burghfield (14 April 1993)

I am afraid I must advise you of a discrepancy that has recently come to light in figures given to the Committee on reportable accidents and incidents at AWE Burghfield; the figures were published in the Committee's report on the progress of the Trident programme (HC 237, 1989/90).

The revised figures compared with those quoted in the Defence Committee's report are:

1987		1988		1989	
Reported	Revised	Reported	Revised	Reported	Revised
77	77	83	95	78	93

The problem arose because one of the AWE sites continued to record absences of 4 days or more, rather than the 3 days or more required by current legislation. Steps have of course now been taken to ensure that all staff involved in the production of these statistics follow the proper reporting requirements.

The mistake was identified during work we were doing to answer a recent PQ for Andrew Bennett MP; we have also written to Mr Bennett explaining the position.

5. Memorandum submitted by the Ministry of Defence on the Trident programme following the Oral Evidence taken on 10 March 1993 (21 April 1993)

Q14. Following the exchanges at Qq 1460 and 1472, it would be helpful to have a full explanation of the £26 million increase in the cost of missiles shown at Answer 3a.

A14. As the response to Q1460 indicates, the 1992 estimate for expenditure on Trident missiles took into account the reduction in US Ohio class submarine hull numbers and the deferment of the US backfit programme. Reasons for the net £26M increase between the 1992 and 1993 estimate were as follows:

		£M at 1991/92 prices & £1=$1.59
a.	Revised assessment of missile unit production costs for remaining UK procurement	46.4
b.	Reduction in contingency to offset above increases	−11.3
c.	Reduction in missile guidance quantities and costs	−17.1
d.	Reassessment of missile assembly costs at Kings Bay	10.3
e.	Miscellaneous minor changes	−2.3
	Total	26.0

Q15. The Committee would also be assisted by any further information available on the periscope (Qq 1494ff).

A15. In addition to optical periscopes, the Vanguard class Self Protection Mast incorporates a number of advanced electronic systems, including low light tactical television and thermal imaging equipments. These electronic systems are relatively new technologies and have had to be integrated into the overall periscope system by the prime contractor, Barr and Stroud. It has therefore been inevitable that a number of initial problems have been encountered.

A large proportion of the problems identified during VANGUARD's contractors' sea trials have now been rectified. Outstanding problems concern the reliability of the electronic systems, and in particular the system's Pure Air Supply Unit. This has now been exchanged for one of a new design and it is expected that system reliability will be satisfactory when VANGUARD is accepted later this year. In addition, higher than expected torque values were measured during trials. A subsequent detailed investigation has identified the major causes of the problem and solutions have now been developed and are being implemented. To counter some ergonomic difficulties with operating the electronic equipments, a programme of work is underway with the prime contractor aimed at overcoming the main difficulties prior to VANGUARD's acceptance.

Q16. The Committee has asked for information, classified as appropriate, on the financial arrangements governing UK nuclear weapons tests in the US, including sums paid for any environmental clean-up (Qq 1539–1540).

A16. The United Kingdom pays the cost levied by the United States authorities for each test on an individual basis. Included in the costs are payments covering arrangements for the management and disposal of radioactive wastes associated with the test, but none are made specifically in respect of environmental issues.

* * *

Q17. Notes on the minimum range of Trident (Qq 1551–2), on any changes in the structural system of agreeing targeting (Q1574), and on the effect on range of a change in propellant (Q1597) would be of assistance.

A17.

* * *

As the Committee will know, successive Governments have always declined to release, even on a classified basis, their nuclear targeting policy and plans. This policy has not changed. It can be confirmed, however, that the UK's targeting plans are flexible and can change to suit differing circumstances.

We accept as reasonable the statement in the Drell report on US nuclear weapon safety that the range of the Trident D5 missile would be reduced by some 150 to 200 nautical miles if the propellant in the missile's third stage was replaced by the Class 1.3 propellant.

Q18. It would be helpful to have a full answer to the question at Q1603, originally posed in written question 10(f).

A18.

* * *

Q19. The Committee would be assisted by a detailed note on the scaling down of the specification for the Trident nuclear refuelling facility, showing the assumptions on refit throughout at the time of agreement on current assumptions, and the consequent changes (Qq 1609–1613).

A19. On the basis that the then strength of the Royal Navy nuclear submarine force would require four refit streams in total, the nuclear refitting facility (RD57) was designed originally to refit both SSNs and Vanguard class SSBNs in parallel, in two adjacent docks. The SSN refit programme at RD57 was expected to be virtually continuous, with each refit expected to take some two years to complete. Vanguard class submarine refits would have been undertaken with a gap in between each, during which time it was expected to use the SSBN dock for routine nuclear submarine dockings, or for de-fuelling and de-equipping operations.

As a result of more recent detailed studies carried out by the Ministry of Defence, with the involvement of industry and support of specialist consultants, we have been able to pursue alternative options which are considered to offer a more cost effective solution. The size of the nuclear submarine force has now reduced with a corresponding reduction in the requirement for refit facilities and both Dockyard Contractors have used this in their bids to become the sole nuclear refitting contractor.

* * *

6. Letter to the Clerk of the Commitee from the Private Secretary to the Secretary of State for Defence on the costs of underground nuclear tests and the frequency of nuclear convoys (7 May 1993)

Thank you for your letter of 22 April about the classification of answers to the Committee's questions on the costs of underground tests at Nevada and on the frequency of nuclear weapon convoys.

I am afraid we are unable to agree to declassify the total cost of an underground test at Nevada, or to provide an approximate figure on an unclassified basis. It remains the Government's view that to disclose financial information relating to the underground test programme, or any other aspect of the nuclear warhead programme, could risk revealing details of, for example, the direction our research and development programme is taking, or the level of nuclear capability of our forces. Such information could be useful to anyone constituting a potential threat to UK security interests.

I am also sorry that, for similar reasons, we cannot agree to declassify any information which might assist in identifying the pattern or frequency of nuclear weapon convoys.

7. Memorandum submitted by the AWE Trades Unions (26 May 1993)

1. The AWE Trades Unions wish to express their gratitude to the Committee for putting a time slot aside in order to meet with us on the 29 April 1993.

We posed a series of questions and comments to the Committee and stated that we would present these to the Committee with some amplification which was asked for at the time.

2. The following questions were put to the Committee:—

2.1. One of the major benefits put to the AWE TU's with regard to GOCO status, was that this would allow the flexibility to pay AWE employees salaries commensurate with the importance of their work and at least compatible with other major industries in the area. Hunting Brae (HB) have given every indication that they will continue with the same constraints as those currently exercised by the MoD. Indeed the requirement to demonstrate savings to the MoD has reinforced this position.

Will the Select Committee, who have previously called for an increase to AWE employees' salaries, offer us an assurance that they will continue to so do,as there seems little evidence that HB intends to meet the justifiable requirements of its' employees as regards to fair pay?

2.2 Following on from recent press speculation, we asked how much longer will we have to wait before we know the Government's decision regarding the future nuclear weapons programme? Since your meeting with us we are not aware of any decisions having been made but we would appreciate any information that you can give us on this subject.

2.3 The current AWE work programme is now being organised into a series of project contracts and it is not clear whether all of these contracts will be awarded to Hunting Brae. If contracts are let to other organisations, how does the Select Committee see that both we and it will be able to ensure the safe working of the Establishment?

This question led us into a brief discussion on safety matters during which we told you that we had been told that we did not have access to the Compliance Office. You then asked for examples of matters giving us cause for concern.

2.3.1. The proposed and partially implemented cut back in shift working:

a) The Industrial Trade Unions are concerned regarding the amalgamation of the gas shift team with the HEM shift engineering team which resulted in a reduction of 10 out of 25 posts.

When one compares this with the recommendations of the Pochin Report (see attached extract from the report*) we now have a situation similar to that appertaining at AWE before Pochin. Whilst this could be construed as being safe provided there are no incidents during silent hours we feel that if such an incident should occur during these hours there would be insufficient staff available to deal with it.

Management are looking to see if this team can be further reduced but this would cause concern to both the NITU's and ITU's because we believe that the team would be too small to address the workload placed upon it in normal circumstances let alone in an emergency.

The ITU's have argued that this is taking us back towards the pre-Pochin era. The management response is that Pochin is out of date and takes no account of technological advances. If this is true we need a new enquiry into safety and the safe operation of AWE in order to negotiate with an up-to-date yardstick.

(Since our meeting you will be aware that there has been the announcement of the Health and Safety Executive Review of AWE and we have been told that this review will be looking at all of the emergency arrangements.)

b) The transport shift has been abolished because Management are convinced that if a serious event occurred during silent hours requiring the site at AWE(A) to be evacuated this could be achieved by employees using their own cars,backed up with an on-call system to get extra employees to AWE using their own cars or local taxicabs. This will lead to ensuing chaos resulting in people going off in all directions rather than being taken to a set evacuation point from which they can be deployed to help in the post event recovery programme. We believe that this will make the response time longer than hitherto and again there will be less people immediately available to deal with the incident since it has been suggested that some of these people could double as drivers when in fact they are on site during silent hours with well defined duties which would still have to be addressed during the emergency.

There is now an ongoing review into the Transport Section at AWE Foulness and we await its outcome and recommendations.

c) The boilerhouse shift has been reduced by one without consultation with the Trade Unions,but with some hint of the possibility of this occuring,again reducing the number of people available during silent hours and again flying in the face of the Pochin recommendations.

We are not saying that these changes and proposed changes are bringing in unsafe practices but in the event of an emergency we believe that we will not be able to respond in the manner that is expected of us.

2.3.2 Access to the Compliance Office.

Mr Keep on behalf of the ITU's approached the Compliance Office seeking guidance concerning an issue at AWE(A). For so doing he was told at a Joint Whitley Committee meeting by the Chief Exec. that he should not have gone there. The Compliance Office is there to oversee HB and not for the Trade Unions. The NITU's had previously been told that they had no right of access to the Compliance Office but they would be interested in anything that we had to say. This is clearly an unsatisfactory arrangement and needs to be altered. If we have an issue which we feel must be raised with the Compliance Office, we should be able to approach that office. Courtesy would require us to make our intentions known to Hunting Brae prior to going to the Compliance Office.

2.4 We understand that there has been a problem regarding some of the contracts between MoD and Hunting Brae which is resulting in a cut back on some if not all projects. The problem appears to be that the bids for the projects were made minus VAT and were accepted by MoD who apparently presumed the bids to include VAT. We asked the Select Committee to bring pressure to bear on the MoD in order that it meets this VAT payment. If this money is not forthcoming it will have a dire effect on the workload of AWE. We have already been informed that there has been a substantial cut-back in the programme of road maintenance at AWE(A) and other cuts must surely follow.

2.5 The Draft AWE Redundancy Scheme does not meet the Ministerial assurances given by Kenneth Carlisle during the passage of the AWE Bill through parliament.We asked you to press the MoD to improve upon the scheme in order for it to meet the assurances which had previously been given and you asked for examples of the shortfall. We enclose for your perusal a copy of the March 1993 Insight and copies of correspondence between some of our members

*Annex A.

and MoD*. It appears from the latest response to Mr.Lamb that MoD has recognised the problem and IPMS will be seeking a further meeting with CM(IR) MoD in order to resolve it.

2.6 Finally we raised with you the question as to whether or not special paid leave should be available to those members of staff at AWE who participate in MoD sporting events. We contend that the rules governing the granting of leave for this purpose are covered by MoD Manual 9, para 0958, and MoD Manual 11, para 0471 and these should operate into the future until the AWE Management negotiates with the Trade Unions to replace them.

MoD Man. 11, para 0471.

Sports Leave.

a. special paid leave may be granted to staff selected to represent

1. the United Kingdom or one of the constituent countries;

2. the Civil Service;

3. the MoD (including the finals of the MoD Intra-Departmental events organised by the Defence Sports and Recreational Association.

The AWE Management have indicated that they will only consider applications for special leave relating to 1 above and have refused all applications for sporting events within the MoD to which our members are already committed this year. We do not think this is right and would ask you to challenge MoD/Hunting Brae on this interpretation.

Once again we thank you for having met with us and hope that you will be able to help with the questions which we have raised.

ANNEX A

Extract from Section 13 of Annex H to the Pochin Report[1]

However, from a professional safety aspect, redundancy of effort (which is deliberately reduced by the doctrine) is quite necessary, as discussed in para 3 of this Annex, and it is to be hoped that this will be emphasised at an early review of staffing cadre. The current cadre has been reduced considerably (by about one-third over the last decade) as part of general cuts. This is unsound in principle (see para 10(a) of this Annex); and even the reduced cadre cannot be filled, having a 16% deficiency of craftsmen, with many other vacancies. The situation merits attention.

The lack of redundancy of effort is eased slightly by the use of outside contractors (eg, an Insurance Company performs routine testing of some pressure vessels and lifting appliances).

(iii) The Engineering incident control room was visited; the safety patrol system operates from here. This also appeared to be "cut to the bone", with the staff of patrolmen and watchkeepers reduced by 50% although the question of an increase on grounds of security is under consideration.

8. Memorandum submitted by the Ministry of Defence, answering the Committee's questions following the visit to AWE Aldermaston (3 June 1993)

Q1. Are there any plans for changes to pay and conditions now that full vesting day has passed? Are the pay restraints placed upon MoD to apply to the workforce of AWE plc also?

A1. Pay and conditions at AWE are now a matter for Hunting-BRAE although they have indicated to us that they intend to introduce pay and conditions changes aimed at rewarding performance and output and removing restrictive practices. Pay restraints placed upon the public sector do not apply directly to AWE.

Q2. With the exception of specialist staff has recruitment at Aldermaston ceased? What is the annual turnover of staff 1990–92?

A2. Recruitment is now a matter for Hunting-BRAE although they have indicated that they intend to continue recruitment for both specialist staff and some others as required to meet the tasks required by MoD. Total turnover rates for the period 1990–1992 have been:

January–December 1990	13.5%
January–December 1991	10.1%
January–December 1992	9.5%

The turnover figures are based on outflow for all causes.

*Not printed.

[1] E.Pochin. "Report of an Investigation into Radiological Health and Safety at the Ministry of Defence (Procurement Executive) Atomic Weapons Research Establishment, Aldermaston". Harwell, Oxfordshire, 30 October 1978.

Q3. Are other companies competing with Hunting-BRAE for MoD nuclear project contracts?

A3. No.

Q4. How is VAT accounted for with regard to payment for MoD project contracts with AWE?

A4. VAT is accounted for as follows:

a. The contractor attributes his production costs—less the input VAT which he has paid—to the project contracts;

b. The contractor adds output VAT at the standard rate of 17.5% to the production costs of the project contracts at a. above. The totals comprise the bills passed to MoD for payment.

c. MOD pays the bills as at b. above, and subsequently recovers from Customs and Excise the difference between the input VAT which MoD would have continued to pay had AWE not been contractorised and the full output VAT paid to the contractor.

Q5. Contractorisation of AWE was accompanied by ministerial assurances that the staff of the new AWE plc would be no worse off than they had been as employees of MoD. Do the new redundancy terms leave some employees worse off? It would be helpful to have a breakdown of the old and the new redundancy terms.

A5. It is confirmed that, in accordance with Ministerial assurances, employees transferred from the Civil Service to AWE plc at Vesting Day will, in the event of their redundancy, receive benefits of at least equivalent value to those they would have received under the Civil Service terms applicable immediately prior to Vesting Day. Should individual cases arise where it is clear that the redundant employee is being offered terms which are less than the Civil Service equivalent, then appropriate steps will be taken to ensure that payments, as a whole, will be as good as those that would have been paid in the Civil Service. A more detailed explanation is at Annex A.

Q6. Are AWE staff entitled to paid leave for official MoD sports events?

A6. Special paid leave within MoD for sports events has always been at management's discretion. Now that AWE is no longer part of the Civil Service we understand that Hunting-BRAE have no plans to grant paid sports leave for MoD events.

Q7. What functions are A45 and A1.1 to have following completion of A90? What has been the extra cost, in terms of manpower and maintenance, of keeping A45, A1.1 and A12 in operation on the first outload beyond the date expected for Trident work to have commenced in A90 and A91?

A7.

* * *

The extra manpower and maintenance costs of keeping the existing facilities in operation beyond the date originally planned for Trident work to have commenced in the new buildings is estimated at £1.5M. This has been largely offset as equivalent expenditure in the new facilities has been built up later than had been originally planned.

Q8. Is any timescale available for the Nirex decision presently holding back work on facilities A89.3 and A89.4? Once a go-ahead is received, what is the timescale for their completion?

A8. The Nirex programme indicates that the acceptance specification for waste packages will not be finalised before the year 2000. It will not be possible, therefore, to complete detailed design for A89.3 and A89.4 facilities before that time. It is too early to provide a timescale for completion of facilities as this depends on the criteria set for preparing wastes for disposal.

Q9. Is there a guaranteed right of access on safety matters by the trades unions to the Compliance Office? Are there written guidelines?

A9. The normal arrangement for AWE staff to raise matters of concern, safety or otherwise, is through existing line management channels; this arrangement continues under contractorisation. However, all groups or individuals have the right to raise issues with the Compliance Office and this point has been reiterated in a site notice.

Q10. Has application been made for additional Ministry of Defence Police numbers? At whose expense is the MDP presence maintained?

A10. MDP Security manpower at AWE is subject to frequent review. Recent examinations indicate a requirement for additional MDP manpower to comply fully with current requirement standards, and arrangements are being made for such increases to be implemented. The cost of MDP at AWE sites is borne on the Chief Constable's MDP budget which forms part of the Defence Budget as a whole.

Q11. Is vetting for all staff being carried out as it was before contractorisation? What are the "security projects" you referred to in written evidence to the Committee (Ref A33e Appendix 2 to 1991–2 Report on Trident)?

A11. Vetting for all staff is being carried out as it was before contractorisation. The "security projects" referred to are in the main the following items:

* * *

ANNEX A

AWE REDUNDANCY TERMS

1. Under Civil Service arrangements, AWE employees had entitlement on redundancy to benefits under the Principal Civil Service Pension Scheme (PCSPS) or in some cases, under the Principal Non-Industrial Superannuation Scheme of the UKAEA (the UKAEA Scheme). Certain of these benefits cannot be paid by a private-sector type pension scheme approved by the Inland Revenue and hence, in addition to the new AWE Pension Scheme set up for AWE employees from Vesting Day, the Contractor has been required (under the terms of the Contract with MoD) to establish a separate Redundancy Payments Scheme on terms acceptable to MoD to provide benefits which, when taken together with AWE Pension Scheme benefits, are at least equivalent in value to the benefits enjoyed under Civil Service redundancy terms.

2. This Redundancy Payments Scheme will be financed on a "pay as you go" basis by the Contractor. An undertaking has been given at Ministerial level that any redundancies arising directly from changes in the nuclear programme will be fully funded in accordance with the Scheme.

3. In establishing "equivalence of value" of the various benefits, annuity and other discounting factors have been supplied by the Government Actuary. Benefits will be "index-linked" as under the Civil Service terms.

4. The AWE Pension Scheme benefits that would be payable on redundancy are those applicable to an ordinary "early leaver", so that no financial strain is placed on that Scheme from the provision of enhanced benefits on redundancy. Where an individual had decided to leave his, pre-Vesting Day Civil Service pension rights in PCSPS or the UKAEA Scheme, rather than transfer them to the AWE Pension Scheme, the deferred benefits in PCSPS or the UKAEA Scheme will be included in the equivalence calculation.

5. There are several flexibilities open to individual members under the AWE arrangements, for example taking early payment of reduced benefits from the AWE Pension Scheme and PCSPS, and for converting part or all of certain lump sums from the Redundancy Scheme into annual compensation payments payable to the individual's normal pension age.

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