HOUSE OF COMMONS SESSION 1991–92

DEFENCE COMMITTEE

Fifth 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*
11 March 1992

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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.

WEDNESDAY 2 DECEMBER 1987

The following were nominated Members of the Committee

Mr John Cartwright	Mr John McWilliam
Mr Churchill	Mr Michael Mates
Mr Dick Douglas	Mr Jonathan Sayeed
Mr John Evans	Mr Neil Thorne
Mr Bruce George	Mr John Wilkinson
Sir Barney Hayhoe	

Mr Michael Mates was elected Chairman on 9 December 1987.

On 28 April 1988 Mr John Evans was discharged and Mr John McFall added to the Committee.

On 16 May 1990 Mr Dick Douglas was discharged and Mr John Home Robertson added to the Committee.

On 26 October 1990 Mr John Wilkinson was discharged and Mr John Lee added to the Committee.

On 18 March 1991 Mr Jonathan Sayeed was discharged and Mr Michael Knowles added to the Committee.

The cost of printing and publishing this Report is estimated by HMSO at £10,944.
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FIFTH REPORT

The Defence Committee has agreed to the following Report:

THE PROGRESS OF THE TRIDENT PROGRAMME

I. INTRODUCTION

Background

1. In June 1980, the then Defence Committee began an inquiry into the future of the United Kingdom's strategic nuclear weapons policy. The following month, the Government announced its decision to procure the Trident missile system to replace Polaris. On 3 March 1981, the House endorsed that decision, by 316 votes to 248. Since then, successor Committees have monitored the progress of the Trident programme and have regularly reported to the House on issues arising from the decision to acquire Trident.[1] These reports have covered a number of key headings:

(a) the costs of Trident, its implications for the rest of the defence budget, and its industrial and employment implications;

(b) the progress of procurement of the warhead, missile, submarine and tactical systems, and of associated shore construction;

(c) issues arising at the Atomic Weapons Establishment in relation to manpower, capital works and management and contractorisation;

(d) the timing of the Trident programme and the implications for Polaris.

2. It is now twelve years since the first inquiry by the Select Committee. The Trident programme is nearing fruition, with the in-service date of the first Trident submarine, HMS VANGUARD (SSBN 05) expected to be in late 1994 or early 1995.[2] In the intervening period, a number of problems have arisen and decisions have had to be taken on different elements — the choice of missile, the warhead production facility, the tactical weapon system, shore construction and others. We have investigated these as they have occurred and reported our findings to the House. At this stage, as HMS VANGUARD prepares for sea trials, we examine several issues which have arisen during the past year, and also some aspects of the way the Trident programme as a whole has developed.

Annual Report

3. In undertaking this inquiry, we have taken written and oral evidence from the Ministry of Defence and we have visited Faslane, Coulport and Hunterston to see at first hand the massive shore construction programme for the introduction of Trident. We are conscious of the workload which this imposes and we are grateful to the Secretary of State and to officials for their assistance. We have also had before us the Secretary of State's annual report on the Trident programme. On 4 February 1992 the Secretary of State announced, in the course of defence oral questions, his revised estimate for the cost of Trident. At the same time, without formal notification to the House, his annual report was placed in the Library.[3] **We recommend that the Secretary of State reverts to the previous**

[1] For details of reports see Annex.
[2] See paras 17 and 29 below.
[3] HC Deb, 4 February 1992, col 116; Evidence, pp 23–24.

practice of announcing in a parliamentary answer the laying of his annual Trident report. In 1985 our predecessor Committee called for "a regular and detailed progress report on the state of the programme as a whole".[1] The Government's response to this recommendation was to produce from January 1986 a short annual report on the progress of the programme which has been submitted to us when the revised cost estimate for the programme is announced to the House. **We welcome this practice as a commendable means of informing the House and of enabling the Committee to focus its inquiry on the key issues at any one time. It is also a practice which could with advantage, and relatively little additional work on the department's part, be extended to other major MoD procurement projects.**

Progress

4. As we noted in our report last year, the programme as a whole is progressing well; it "continues on schedule, and within budget".[2] Three of the submarines have been ordered. The first of class, HMS VANGUARD, is now afloat at Vickers Shipbuilding and Engineering Limited's (VSEL) yard at Barrow, preparing for sea trials. One crew is already trained and standing by VANGUARD, another crew is in formation, and elements of the crew for VICTORIOUS are in training.[3] The strategic weapon system as a whole is now fully operational in the US Navy. Despite delays, the tactical weapon system is gradually approaching an operational state. The works programme has progressed over the last year, although delays caused by earlier difficulties with a number of major projects are unlikely to be recovered in full. **We can confirm that in general good progress is being made.**

Arms control

5. Throughout the 1980s, the Government took the view that the Trident programme represented the maintenance of a minimum nuclear deterrent by the UK and should not therefore be included in arms control negotiations. In response to the argument that Trident represents an increase in the scale of the UK's deterrent, the Government pointed out that even if the submarines were deployed with a full complement of missiles and warheads, the ratio between the number of UK and Soviet warheads would be even less favourable to the UK than it had been when Polaris was introduced. The recent moves by the United States and the Russian Republic to "deep cuts" in their strategic nuclear weapons have led to renewed suggestions that the other declared nuclear weapons states — the UK, France and China — should participate in negotiations and reductions. The Government has continued to take the view that Trident is a minimum deterrent and that the focus of negotiations should be between the super powers. President Yeltsin has apparently accepted that Trident is a minimum deterrent. **Nonetheless, 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 are once again legitimate political and military issues, although we have not addressed them in the context of this annual report to the House.**

II. COSTS &c

Overall costs

6. The overall estimate now stands at £10,518 million at 1991–92 prices, and the general trend in costs continues to be downwards. As we observed last year, the principal factor in this has been reductions in the costs of the missiles and strategic weapon systems equipment purchased in the USA.[4] This past year there has been a small reduction overall, of £17 million, with the main change being in the use of contingency funds to cover increases in the costs of shore construction, submarines and the tactical weapon system.[5] In 1991–92 prices, the current estimate is around £1,875 million less than the 1981 estimate, or £2,899 million less when the savings from the decision to service missiles at King's Bay are taken

[1]Sixth Report from the Defence Committee, HC 479 of Session 1984–85 (1985 Report).
[2]Eighth Report from the Defence Committee, HC 286 of Session 1990–91, para 1 (1991 Report): Evidence, p 23, para 1.
[3]Q2074.
[4]1991 Report, para 4.
[5]Evidence, p 26, A3: p 23, para 10.

into account. MoD told us that this is the sixth successive year in which the estimate has fallen.[1] **We again draw the House's attention to the gratifying and unusual spectacle of a major defence procurement programme coming in far below estimate.**

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	1981–82/1.78
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

**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 (44%)	4,207 (56%)
Inflation	5,305	1,645	3,660
Exchange Rate Variations	592	592	—
King's Bay Changes	−1,025	−340	−685
Real Changes	−1,874	−2,269	395
Current Estimate (1991–92 prices $1.59)	10,518	2,941 (28%)	7,577 (72%)

Source: Based on Evidence, p 25, Table 1.

[1] Q2013 and note by witness.

TABLE III

Real Cost Changes: 1981–92

	Estimated cost £m	*Expenditure in US* £m	*UK* £m
Submarines (less weapon systems equipment)	−1,151	−235	−917
Missiles	−838	−803	−35
Strategic Weapon system equipment	−454	−464	+11
Tactical systems	+277	+3	+274
Shore Construction (excluding Rosyth)	+696	—	+696
Rosyth Works and Functional machinery	+55	—	+55
Warhead, miscellaneous and unallocated contingency	−458	−771	+312
Total	−1,874	−2,269	+395

Note: Figures rounded, hence any apparent imbalances.

Source: Evidence, p 25, Answer 1. This table excludes savings resulting from decision to refurbish missiles in King's Bay. This accounts for £1,025 million in the current estimate.

Annual pattern

7. By November 1991 £5,074 million had been spent on the programme: £3,913 million (77 per cent) in the United Kingdom and £1,161 million (23 per cent) in the United States, representing 53 per cent of the revised hybrid estimate.[1] A further £1,575 million has been committed. £1,160 million is to be spent in 1991–92, compared to £1,019 million in 1992–93 and £827 million in 1993–94.[2] By 31 March 1992, expenditure is expected to have reached 56 per cent of the total estimate.[3] Peak annual expenditure has now been reached, although it is noticeable that as much as £1,746 million remains to be spent from 1995–96 onwards.[4]

TABLE IV

Changing Estimate of the proportion of the Trident programme to be spent in the US: 1980–92

Date	*Exchange rate*	*Price base*	*US* £m	*Spend* %	*UK* £m	*Spend* %	*Total* £m
July 1980	$2.38	Sept 80	1,565	30	3,650	70	5,215
March 1982	$1.78	Sept 81	3,313	44	4,207	56	7,520
January 1985	$1.38	1984–85	4,143	45	5,142	55	9,285
March 1986	$1.28	1985–86	4,477	45	5,392	55	9,869
January 1987	$1.50	1986–87	3,479	38	5,786	62	9,265
January 1988	$1.62	1987–88	3,229	36	5,814	64	9,043
January 1989	$1.76	1988–89	2,930	32	6,159	68	9,089
January 1990	$1.62	1989–90	2,902	31	6,477	69	9,380
January 1991	$1.56	1990–91	2,864	29	6,999	71	9,863
January 1992	$1.59	1991–92	2,941	28	7,577	72	10,518

Source: HC 286 of Session 1990–91, Table V and Evidence, p 25 Answer 1b.

[1] Evidence, p 26, A2; p 23, para 10; Q2013.
[2] Evidence, pp 26–7, As 4, 8, 9.
[3] Evidence, p 24, para 11.
[4] *Ibid.*, p 27, A8: see also First Special Report, HC 27 of Session 1991–92, para 3 (1991 Reply).

UK/US expenditure

8. There have been variations over the years in the percentage of costs attributable to different elements: but the steady trend has been upward in UK expenditure and downward in the US, even when exchange rate variation costs — now estimated at £592 million — are taken into consideration. In 1991–92 prices expenditure in the US is anticipated to be £2,270 million below the 1981 estimate, while UK expenditure is almost £400 million above estimate.[1] Savings on the submarine and on the strategic weapon system (SWS) have been more than offset by additional expenditure on the tactical weapon system (TWS) and on shore construction; we have over the past years paid particular attention to these programmes. One effect of the declining costs of the programme in the US is to limit the effects of changes in exchange rates. For example, a fall in the £1 from $1.59 to $1.50 would now mean increased costs of £176 million compared to £313 million when the "dollar content" of the programme was higher.[2] The reduced overall exposure to exchange rate fluctuations is welcome: it must however be remembered that much US expenditure is still to come. The US decision not to retrofit the Trident II (D5) missile system into earlier Trident I (C4) submarines will increase the cost to the UK of its missile purchases, by around £66 million, since smaller US orders over the years ahead will put up unit costs.[3] It does not however look likely that there will at this stage be significant cost increases in the US side of the programme.

Contingency

9. Throughout the lifetime of the programme a sum has been allowed for contingencies, both within each identifiable part of the programme, and as a centrally managed unallocated contingency. The unallocated contingency has fallen steadily over the years, as it is gradually attributed to those programmes which require extra funds. Total contingency allowances were £1,146 million in 1988–89. They are now £566 million, of which £356 million is unallocated.[4] We noted last year that MoD was using contingency funds exactly as was intended. In his 1992 Report the Secretary of State told the House that "good overall progress on the project has allowed levels of contingency to be reduced".[5] MoD regularly assesses "the level of financial risk inherent in each element in the programme", and is confident that there is still sufficient contingency funding, despite the volume of expenditure still to arise.[6] Contingencies are expressed as a percentage of unspent balance. A substantial contingency exists for the works programme, while very little remains for the tactical weapon system.[7] MoD described the central unallocated contingency of £356 million as "sizeable".[8]

Attribution of expenditure to Trident

10. In 1985 and again in 1988, we examined the extent to which the cost estimates for the Trident programme included other expenditure essential to the procurement, operations and maintenance of Trident.[9] This includes such projects as the improvements to the UK's Very Low Frequency Communications System, much of the construction and modernisation at Faslane and Rosyth, and at AWE Aldermaston and Burghfield. Many of these developments are intended for the RN submarine fleet as a whole, or are in support of the United Kingdom's wider nuclear weapons capability. In 1988 we noted a marked decline in the proportion of Faslane and Rosyth works attributable to Trident between 1985 and 1988, falling from 65 per cent by value to 54 per cent, and that the same was true at AWE Aldermaston and Burghfield.[10] As we observed in 1988 —

[1] Evidence, p 25, A1.
[2] *ibid*, A1c.
[3] Evidence, p 29, A16.
[4] *ibid*, p 27, A7.
[5] *ibid*, p 23, para 10.
[6] Q2012.
[7] Q2014 and Evidence, p 35, para 1.
[8] *ibid*.
[9] 1985 Report, para 5; Third Report from the Defence Committee, HC 422 of Session 1987–88, para 17ff (1988 Report).
[10] 1988 Report, paras 21 and 22.

"The attribution may . . . not be wholly realistic, in that it is based on the premise that *Trident* will be procured".[1]

None of the development cost of the PWR2 propulsion unit has been allocated to Trident.[2] We also noted in 1985 that the waiver by the US of part of research and development expenses of Trident which might have been recouped was presented in 1980 as an offset for the cost of the manning by the United Kingdom of Rapier air defence of USAF bases in the UK.[3] Despite recent US withdrawals, the Rapier bill for 1992–93 is of the order of £6.5 million with a continuing requirement until 2001.[4] This unrecouped expenditure, unlike the development levy paid, is not a cost attributed to Trident. At a similar level of expenditure, the costs of two tugs recently ordered for Faslane are not to be attributed to the Trident programme.[5] Without the justification provided by the Trident programme, there are a number of projects which would not have been undertaken at all. **It is our impression that attribution of costs specifically to Trident may have erred on the low side, with the effect, intentional or not, of understating the real costs of the programme.** On the other hand, there have also been spin-offs from the programme which may reduce the costs of other programmes: for example, the next generation of nuclear-powered submarines, the follow-on Trafalgar class, will benefit from some equipment developed for Vanguard class boats.

Trident and total defence budget

11. When the Government first announced its decision to purchase Trident, the likely order of cost was thought to be £4½–£5 billion, spread over 15 years, with the programme assessed as unlikely to absorb more than 3 per cent of the total defence budget between 1980 and 1995, or more than 5 per cent of the equipment budget.[6] Although the decision announced in March 1982 to build submarines able to accommodate the Trident II D5 missile and to equip them with the most advanced propulsion unit and tactical weapon systems led to some increase in the costs and the timescale of the programme, in real terms the cost has declined from the original broad estimate. The current position as announced by the Secretary of State in this year's Report is that —

"The proportion of the Defence budget which the Trident programme takes over its 20 year procurement period has reduced from 3 per cent to less than 2½ per cent on average".[7]

MoD told us that this calculation took into account forthcoming falls in the defence budget, and that the estimated percentage was in fact now below 2½ per cent.[8] **While at its peak Trident has been absorbing around 5 per cent of the annual defence budget, and as much as 12 per cent of the annual equipment budget, its significance within the defence budget will decline throughout the decade.**

Costs of strategic nuclear forces

12. Until Polaris is phased out Trident will be only one element in the UK's strategic nuclear forces. Costs arising from the continued operation of Polaris can be expected to remain significant. In 1991–92, the estimated cost of the strategic nuclear force was estimated at £1,445 million, some 6.3 per cent of the total defence budget.[9] Expenditure on Polaris has remained at about £250 million per annum over the past decade; in 1991–92 it is estimated to be £210 million.[10] From this can be seen the extent to which the costs of strategic nuclear forces are front-loaded: that is to say, that it is their procurement rather than

[1] *ibid*, para 17.
[2] 1988 Report, para 32.
[3] Cm 7979, and Cm 8517.
[4] Qq 2028–9.
[5] HC Deb, 12 February 1992, cols 511–512*w*; *ibid*, 20 February 1992, col 292*w*.
[6] Open Government Document 1980.
[7] Evidence, p 24, para 12.
[8] Qq 2015–6.
[9] SDE 91, Figure 9.
[10] Evidence, p 26, A4.

their operation which is massively expensive. MoD has stated that the level of running costs of the Trident force is not expected to be significantly different from those of Polaris.[1]

Employment opportunities

13. In October 1980 the then Committee was informed that in the peak years 1985–90, the Trident programme might sustain up to 25,000 jobs annually in the construction, shipbuilding and engineering industries and another 20,000 jobs indirectly in the supporting industries such as iron and steel, electrical engineering and electronics.[2] By 1985, this estimated figure had been significantly reduced to 17,000 direct and 15,000 indirect job opportunities during the peak years with average job creation over the whole period of 9,000 direct and 7,000 indirect opportunities.[3] By 1988, the figures had been revised downwards yet again to 15,000 direct and 12,000 indirect jobs in the peak years.[4] The relevant figures now provided by MoD are that on average the Trident programme will provide 14,500 direct and 11,500 indirect jobs during the peak years of the programme (1990–1993).[5] There have been comparable falls in the estimated numbers of direct and indirect jobs provided over the whole procurement period: the 1985 figures of 9,000 direct and 7,000 indirect job opportunities have now been reduced to 7,000 direct and 5,500 indirect jobs.

14. **Estimates of the overall number of UK jobs created or safeguarded as a result of the Trident programme have broadly been halved over the past 10 years, in contrast to expenditure in the UK which has risen substantially in proportion to expenditure in the US.** Some of this is no doubt accounted for by more economic use of labour resources by contractors, notably VSEL and the principal construction firms, and by MoD itself. MoD officials were however unable to account for the fall.[6] The experience of watching these figures fall confirms our attitude of scepticism towards estimates of employment opportunities generated by defence expenditures.

15. We noted in 1988 that Trident would require fewer staff at RNAD Coulport than Polaris, and that MoD was considering establishing alternative employment there to replace the jobs lost when Polaris is withdrawn from service. We were told this year that the effect of the decision to service the missiles at King's Bay, Georgia, taken together with other factors, meant that jobs at RNAD Coulport would in course of time be approximately halved, most of which it was hoped would be achieved by natural wastage.[7] In December 1987 the then Minister of State for Defence Procurement told the House that —

> "a high priority is already being given to establishing what alternative employment may be possible to replace that currently offered by Polaris".[8]

In evidence to us this year, MoD officials did not attempt to conceal that such alternative employment had proved hard to find, nor that the prospects of identifying such employment against the background of cuts in the naval support infrastructure were poor. The only identifiable change had been the selection of Coulport as the single site for Mk 24 Tigerfish torpedo servicing.[9] **We expect MoD to continue in its efforts to identify alternative employment for those elements of the workforce at Coulport displaced by the replacement of the Polaris by the Trident force.**

UK contracts in USA

16. Although no formal offset agreement was obtained for British expenditure in the US under the Trident programme, British firms were allowed, under the 1982 agreement, to compete in the US on the same terms as American firms

[1] HC Deb, 3 March 1992, col 140*w*: Q2075. See para 17 below.
[2] Fourth Report from the Defence Committee, HC 36 of Session 1980–81 (1981 Report), Evidence, p 79, para 20.
[3] 1985 Report, para 32.
[4] 1988 Report, paras 94ff.
[5] Evidence, p 23, para 7.
[6] Q2007.
[7] Q2008.
[8] HC Deb, 8 December 1987, col 142*w*.
[9] Qq 2019–2022.

for sub-contracts for weapon system components for the Trident D5 programme as a whole. In practice, only a relatively small number and value of contracts have been awarded to British firms. By March 1986, 185 contracts with a total value of some $44 million had been awarded to 51 British companies.[1] The latest position is that, taking account of follow-on contracts, 70 British companies have obtained a total of 557 contracts with a total value of $180 million, or £113 million.[2] Witnesses identified several substantive high quality contracts, such as those for sub-assemblies for guidance systems, and for mechanical handling.[3] In 1988 the Department listed the 15 contracts of a value of over £500,000,[4] and stated that "a substantial increase in follow-on orders is not expected until about 1990–91".[5] A list provided by MoD shows a further 13 such contracts, including one worth around £30 million.[6] Although the Secretary of State's 1992 Report notes, as have all its predecessors, that there remain opportunities for further orders during the production phase of the programme,[7] **the total is disappointing when seen in the context of a total US Trident programme worth several billion pounds.** As Mr Hawtin, Assistant Under Secretary of State (Material/Naval), fairly observed, in the current economic climate for the US defence industries, "it will be very hard won business".[8] In 1987, when 1 per cent of the the estimated total UK Trident spend in the US was accounted for by UK participation, we described progress as "steady but unspectacular".[9] UK business now represents 3.8 per cent of total eventual UK spend in the US, confirming the view we took in 1987.

III. OPERATIONS

Mixed Polaris/Trident fleet

17. In past years, we have criticised the Ministry of Defence's reticence over announcing even in broad terms the expected date of VANGUARD's entry into service, particularly in view of publication by a number of sources of 1994 as the date, including the former Prime Minister.[10] **We therefore welcome the Ministry's public confirmation that "VANGUARD is expected to enter service towards the end of 1994 or early in 1995".**[11] From then on, there will be a period of several years during which the deterrent patrol will be maintained by a mixed squadron of Polaris and Trident boats. There will be no major additional costs arising from this, despite the requirement to provide shore support to different classes of boat, meaning the parallel running of two depot operations at once.[12] In 1988 we were told that there would be, at the peak of handover, a personnel requirement bulge of around 800 in order to run these two classes of boat; the latest estimate is of a peak requirement of 750 in 1993 to cover the Polaris/Trident overlap.[13] Trident boat commission lengths may be somewhat longer than for Polaris, offsetting any relative loss of availability because of the King's Bay missile servicing arrangement, thus providing the same periods of three boat availability as with Polaris.[14]

Continuous patrolling

18. There has been some recent comment on the evidence given last year by Rear Admiral Pirnie in relation to the period after VANGUARD will have entered her first refit, and before the fourth submarine is operational. In that context, he assured us that "we can maintain a continuous patrol cycle with only two submarines".[15] In a subsequent note, MoD told us that current planning

[1] SDE 86, para 407.
[2] Evidence, p 23, para 8; Q2023.
[3] Q2025: Evidence, p 35, para 2.
[4] 1988 Report, Evidence, p 20, A13.
[5] *ibid*, A14.
[6] Evidence, p 35, para 2.
[7] Evidence, p 23, para 8.
[8] Q2023.
[9] Third Report from the Defence Committee, HC 356 of Session 1986–87, para 26 (1987 Report).
[10] eg 1988 Report, paras 91–93.
[11] Evidence, p 27, A11a.
[12] Qq 2071–3: Evidence, p 35, para 3.
[13] 1988 Report, para 112; Evidence, p 35, para 3.
[14] Qq 2048–9.
[15] 1991 Report, Evidence, Q40.

assumptions envisaged "a short period" between the commencement of VANGUARD's first refit and the entry into operational service of SSBN 08. The note went on —

> "Because continuous patrolling can be maintained with a two boat SSBN force, there is not expected to be any threat to the continuous deployment of the United Kingdom's strategic nuclear deterrent during this period".[1]

If clarification were needed, Rear Admiral Pirnie amply provided it in evidence to us this year. He explained that periods where only two submarines are operationally available are regarded as periods where there is a risk of a break in continuous patrol, and so are kept as short as possible.[2] Nobody disputes that the patrol can be, and is, maintained *for some period* by two boats, nor that a theoretical patrol programme can be drawn up on the basis of three submarines.[3] Where controvery arises is over the length of period over which such arrangements can be assumed to be practicable, and how cast-iron a guarantee is sought of continuous patrolling: Rear Admiral Pirnie spoke of months rather than years.[4] Mr Hawtin told us that "experience with Polaris over 20 years demonstrates clearly that continuous patrol could not have been maintained with less than four boats".[5] The Secretary of State is reported to have said the same at Barrow.[6] The risk of breaking continuous patrolling is likely to increase with the age of submarines, because of the increased likelihood of defect or accident.[7] The longer the two-boat patrol period, the greater the chance that it may be interrupted in this way. It would help informed discussion of this very greatly if Ministers would declassify the evidence to support this assertion. Rear Admiral Pirnie told us —

> "I have been involved in strategic weapon systems since 1965 and I have been in my current appointment, running the Trident project, for four years now and I can assure the Committee that within the Navy and the Ministry of Defence I personally have a reputation as a consistently strong advocate of the need for a four boat deterrent force".[8]

We acknowledge that this has indeed always been his position.

Resolution class submarines

19. We noted last year that, despite potential operating problems identified a decade ago, at least one Polaris boat will have to be run on into the late 1990s, and that doubts must remain about the reliability and effectiveness of a system kept in service so far beyond the originally intended date.[9] In its observations on our report, the Government expressed its confidence that "the effectiveness of the Polaris force can be maintained."[10] **MoD has this year confirmed its confidence in maintaining continuous deterrent patrols. We welcome this confidence but remain concerned about the condition of the Polaris fleet.**

20. On 9 December 1991 MoD announced that HMS REVENGE, the youngest of the Polaris submarines, would be paid off at the end of her present commission, which began in August 1983, following the completion of her third refit.[11] MoD told us at the time of this announcement that —

> "If HMS REVENGE had been refitted, the submarine would have been in operational service for only a short period before the Polaris force was withdrawn; the exercise would not therefore have been cost effective".

The decision reflected MoD's confidence that the Trident system would deploy on time and that "continuous deterrent patrols will be maintained throughout

[1] *ibid*, page 28, A39: and 1991 Report, para 28.
[2] Qq 2045ff.
[3] Q2060.
[4] Q2056.
[5] Q2044; also Q2054.
[6] Q2046.
[7] *ibid*.
[8] Q2045: also Q2057.
[9] 1991 Report, para 32.
[10] 1991 Reply, para 8.
[11] HC Deb, 9 December 1991, col 349*w*: *ibid*, 21 February 1992, col 340*w*; Q2038.

the transition from Polaris to Trident and beyond".[1] MoD's plans for the future operation of REVENGE are of course classified.[2] HMS RENOWN entered refit in October 1987 for a refit intended to last two years, but which is still in progress: it now seems that she will not be out of refit until late 1992, after five years, as a result of a series of technical problems, together with the need to rectify some defects discovered in the Resolution class.[3] It is not "absolutely vital" that REVENGE continues to be available until RENOWN emerges, since it is possible to maintain continuous patrolling "for a few months" with REPULSE and RESOLUTION.[4] It is in any event clear that, even once RENOWN completes her refit at Rosyth, there will for several years be three operational boats, one of which, RESOLUTION, came out of refit as long ago as September 1984. Of the three SSBNS in the cycle until VANGUARD undertakes its first patrol, it seems likely to us that RESOLUTION and REPULSE may well have to operate on as extended a commission as has REVENGE. **Now that the Trident programme is making good progress, the principal concern must be 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.**

Port visits

21. We have reported to the House elsewhere the widespread concern at the state of the RN nuclear-powered submarine fleet, and we remain constrained both by the classification of the information available to us, and the limitations on information provided.[5] We have continued to raise matters of controversy with MoD, most recently on allegations that there was a ban on such submarines visiting foreign ports.[6] MoD told us that, following a review in early 1990 of the SSN forward programme of operations, only visits "judged to be operationally necessary" had taken place since — to the US, Norway, Bermuda and Gibraltar. SSBNs do not of course make port visits as a matter of routine, the last one being in 1987 when REPULSE visited Port Canaveral in the USA.[7]

IV. MISSILE AND WARHEAD SAFETY

Drell Report

22. We reported last year on concerns that had arisen in the US about potential safety hazards relating to the US Trident missile and warhead, and in particular on the findings of the Panel on Nuclear Weapons Safety of the House of Representatives Committee on Armed Services, chaired by Dr Sidney D Drell (the Drell Report).[8] The Drell Report, published in December 1990, called for a detailed policy review of the type of high explosive used within nuclear warheads and of the class of propellant used in the D5 missile. The US Department of Energy, the authority responsible for warhead production, supported this proposal and the US authorities decided that until the review had been completed, the missile and warhead would be handled separately. We questioned MoD in March 1991 on the implications of the Drell Report for the safety of UK nuclear weapons. MoD's response led us to conclude in our report that —

> "the Ministry's bland assurances combined with apparent attempts to deflect attention from the issue compare poorly with the candid and active response from the US authorities".[9]

MoD Review

23. In its observations on our report last year, forwarded to the Committee on 25 October 1991, MoD stated that —

> "The Government wishes to reiterate its view that the safety of UK nuclear weapons is of paramount importance. It has studied the Drell

[1] Evidence, p 38.
[2] Q2037.
[3] Qq 2051–4.
[4] Qq 2039–2040.
[5] Sixth Report from the Defence Committee, *Royal Navy Submarines*, HC 369 of Session 1990–91.
[6] Evidence, p 37.
[7] *ibid.*
[8] 1991 Report, paras 10–19.
[9] *ibid*, para 19.

Report closely and remains fully confident in the safety of our nuclear weapons. Nonetheless, the Government recognises the level of interest in this issue, and is determined to ensure that there are no reasonable grounds for public uncertainty. Accordingly, and as announced by the Minister of State for Defence Procurement in the House of Commons on 15 October, the Ministry of Defence's Chief Scientific Adviser, Professor E R Oxburgh, has been invited to head a small working group to look into these matters. The terms of reference of the group are as follows: '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' ".[1]

In the debate on 15 October 1991 on SDE 91, the Minister of State for Defence Procurement told the House —

> "as the immediate threat of nuclear confrontation recedes, public attention in the western democracies has increasingly and quite rightly begun to look on the safety and security of the weapons. Last year a major review of nuclear weapon safety in the United States was carried out by Dr Sidney Drell. In the United Kingdom, we have every reason to be confident that our stringent safety standards, exhaustive trials, and continuous review and independent scrutiny ensure the safety of our weapons. Indeed, Dr Drell recommended certain of our arrangements as a model for the United States to follow. But I have nevertheless invited the Department's chief scientific adviser to lead a small working group to examine the safety of United Kingdom nuclear weapons. The group includes a number of distinguished experts drawn from both inside and outside government. They have already started work and have been asked to report by the end of the year. Although their report will, inevitably, be classified, we shall make public a statement of its conclusions".[2]

24. **The appointment of the working group under Professor Oxburgh constitutes a welcome response to the concerns we expressed in our Report last year.** The Minister's statement that "Dr Drell recommended certain of our arrangements as a model for the United States to follow" does however require some comment. The Drell Panel made no request for information on British nuclear weapon safety arrangements, nor did it seek to visit British facilities.[3] Indeed the Report made no reference to British arrangements. In a subsequent Written Answer to a question seeking clarification, the Minister noted that —

> "Section III of Dr Drell's report recommends setting up an advisory committee similar in function to our own nuclear weapons safety committee".[4]

The institution of a broadly similar means of administrative oversight recommended by Dr Drell, without explicit reference to United Kingdom arrangements as a model, falls some way short of the endorsement of safety arrangements implicit in the Minister's remarks.

25. Professor Oxburgh's report had unfortunately not been received by Ministers at the time of MoD's memorandum,[5] although it had been due to be completed by the end of 1991. In oral evidence on 5 March 1992 officials told us that the Report had by then been submitted to Ministers, who were considering it, having received the views of the Nuclear Weapons Safety Committee.[6] MoD told us that —

> "The report is generally reassuring and the initial view taken on it is that it provides welcome corroboration of our confidence in the safety of our

[1] 1991 Reply, para 6.
[2] HC Deb, 15 October 1991, col 172.
[3] *ibid*, 28 June 1991, col 581*w*.
[4] *ibid*, 14 November 1991, col 669*w*.
[5] Evidence, p 29, A19.
[6] Q2134.

weapons and operating procedures . . . [it] has given generally a reassuring statement with regard to the Trident warhead".[1]

Officials told us that Professor Oxburgh had discussed with Dr Drell a range of subjects,[2] and that the studies in the US recommended by Dr Drell had been put in place. They will be looking at any implications of the results for the UK.[3]

26. We noted in our 1991 Report our understanding that the US authorities had decided as an interim measure to handle the missile and warhead separately.[4] The extent to which such measures are justified in the United Kingdom, and the degree to which safety concerns over the US W88 warhead may be applicable to either the current UK Chevaline warhead or UK designed Trident warheads, are matters which can only be considered once Ministers have published Dr Oxburgh's conclusions, and after a full version has been made available to our successors. We understand that some of the concerns over the US W88 warhead may apply to some extent to the US W76 warhead used on the Mk IV re-entry body. **Although it is good news that Dr Oxburgh's report is seen by Ministers as generally reassuring, such reassurance can only be shared by the public at large after publication of the report's conclusions and further scrutiny.**

Transport

27. Eight Truck Cargo Heavy Duty Mk II vehicles are being procured from Brown Root Vickers to replace the existing nuclear weapon transporter fleet in the second half of 1992.[5] The first of these transporters have now been delivered and are undergoing proving trials.[6] MoD officials told us that discussions were still in progress as to how best to meet the requirement for provision of 20 armoured vehicles and 250 special containers to Russia for the movement of nuclear weapons. Some additional procurement to meet this requirement might be needed, presumably either to replace equipment transferred or to procure new equipment.[7] **While welcoming and endorsing this practical form of help, we would be unhappy were any expense incurred in providing such technical assistance to fall on the defence budget as a result. We also seek reassurance that any transfer of assets abroad will have no impact on either the safety of existing warhead transport arrangements in the UK or the timetable for introduction of new means of transport.**

V. PROGRAMME ELEMENTS

Submarines

28. The construction of the four Vanguard class submarines is now estimated to cost a total of £3,810 million, all but £210 million of which is to be spent in the United Kingdom. This represents a welcome reduction of around £1,150 million from the original 1981 estimate, and in particular a halving of the anticipated expenditure in the US. Around 45 per cent of this total estimated cost has now been spent.[8] There has been a small increase in estimated UK spend over the past year, of £47 million.

29. **HMS VANGUARD, the first of class, is expected to enter service "towards the end of 1994 or early in 1995".**[9] VANGUARD's harbour trials, originally due to begin in August 1991, were held four months late, in December 1991, and there has been a parallel slippage of four months in Contractor sea trials.[10] **MoD has, however, assured us that there has been no slippage in its original ISD as planned in 1982.**[11] The reactor core has been loaded and the nuclear steam raising

[1] Qq 2134, 2137.
[2] *ibid.*
[3] Q2135.
[4] 1991 Report, para 18.
[5] 1990 Report, Evidence, p 61, A16: 1991 Report, Evidence, p 30, A47.
[6] Q2139.
[7] Qq 2140ff.
[8] Evidence, p 25: also p 26, A6.
[9] Evidence, p 27, A11a. The precise date of her entry into service remains classified: Evidence, p 36. MoD has confirmed that there is no practical possibility of bringing forward VANGUARD's ISD (*ibid*; Q2083).
[10] Qq 2078–9.
[11] Evidence, p 36: Qq 2012, 2077, 2080.

plant commissioned.[1] VANGUARD was rolled out of the Devonshire Dock Hall at Barrow on 4 March 1992, lowered on the shiplift, and eventually floated off on 5 March 1992.[2] Contractor sea trials are now due to begin in September 1992, lasting around three months.[3] RN contract acceptance trials are scheduled for the first half of 1993.[4]

30. HMS VICTORIOUS, the second submarine, is now fully assembled and welded, and outfitting is proceeding: 14 of the 16 missile tubes have been installed.[5] HMS VIGILANT, the third submarine, ordered in November 1990, is also well advanced, the front and centre sections having been welded together, and the stern section delivered to the Devonshire Dock Hall.[6] Around £170 million had already been spent on construction of VIGILANT prior to the placing of the contract in November 1990, under long-lead arrangements:[7] a total of £311 million has now been spent.[8] Both boats are said by the Secretary of State in his report to be on schedule to meet their planned in-service dates,[9] although in 1990 MoD told us that —

> "it is estimated that the delays in the ordering process of SSBN 07 will have delayed the anticipated in-service date by about six months"[10]

and in 1991 that VIGILANT's ISD was "approximately six months later than was originally envisaged".[11]

31. The invitation to tender for SSBN 08, the as yet unnamed fourth Trident submarine,[12] was issued to VSEL in July 1991, and the tender received in October 1991.[13] By 31 January 1992, £144 million had already been spent on 08, under long-lead arrangements,[14] of which £130 million had been spent by March 1991.[15] Long-lead funding continues,[16] although it would seem at a greatly reduced pace. Under these arrangements steelwork and sub-assembly has made "good progress",[17] as we saw on our visit to VSEL in early 1991. Negotiations are still proceeding, covering a range of issues, including the cost of overheads on all four Trident boats.[18] MoD's chief negotiator, Mr Alan Phipps, Principal Director of Navy and Nuclear Contracts, told us —

> "We are negotiating across every element of the price. There is nothing I would single out as a big sticking point we must overcome . . . we are patiently negotiating our way across a whole range of issues . . ."[19]

32. The delay in placing the order, primarily as a consequence of the delay in placing the order for VIGILANT in the wake of the strike at VSEL in 1988, and the deliberately intermittent release of funds under long-lead arrangements, means that 08 may not be in service before VANGUARD's first refit. We were told in 1991 that current planning assumptions were for a "short period" between the two events, with the continuous patrol being maintained by VICTORIOUS and VIGILANT.[20] It is apparently still conceivable that 08 could be operational

[1] Evidence, p 27, A10.
[2] Q2228.
[3] Evidence, p 27, A11c.
[4] Q2082.
[5] Evidence, p 23, para 2 and p 27, A10.
[6] *ibid.*
[7] 1991 Report, para 24. 34 per cent of the eventually agreed price was spent prior to placing of the contract: Qq 2105–6.
[8] Evidence, p 26, A6.
[9] Evidence, p 23, para 2.
[10] 1990 Report, para 24.
[11] 1991 Report, para 29; Evidence, p 22, A10b.
[12] Qq 2084–5.
[13] Evidence, p 23, para 2; p 27, A10.
[14] HC Deb, 9 March 1992, col 428*w* and Evidence, p 35, para 5; Evidence, p 26, A6 for 31 December 1991 figures.
[15] 1991 Report, Evidence, p 28, A38.
[16] Q2086.
[17] Evidence, p 27, A10: HC Deb, 3 March 1992, col 154 and 140*w*.
[18] Q2091: the costs of the Devonshire Dock Hall were in effect written off at the time of privatisation: Qq 2092–5 and Evidence, p 35, para 4.
[19] Qq 2090, 2108.
[20] 1991 Report, paras 27–28.

before VANGUARD's refit, and a number of different programme options are under consideration. Rear Admiral Pirnie told us that there was as yet no reason why the delay in signing the contract should delay the ISD.[1] Different programme options are being considered for VIGILANT and 08 —

> "in order to achieve the most cost effective and industrially sustainable construction programme while achieving our operational needs".[2]

As MoD pointed out, the time from invitation to tender until order for 08 to date — eight months — is less than the eventual period for any of the other three boats:[3] the sums spent on long-lead for 08 probably represent around 20–30 per cent of the likely final price,[4] compared to 4, 8 and 34 per cent at time of order for 05, 06 and 07 respectively.[5] We have in past reports set out our concerns on long-lead funding, in particular the possibility that "long-lead funding can give rise to extra costs, particularly when it is not maintained on a steady basis".[6] Although we accept that long-lead funding does not necessarily give rise to extra costs,[7] it is clearly preferable for all concerned, including the workforce, that as much as possible of the work should be done under a properly negotiated build contract.

33. In 1991, MoD told us that a decision not to proceed with a fourth boat would lead to savings of around £400–£450 million.[8] A figure of around £400 million[9] was given this year, demonstrating the relatively slow pace of progress in construction of the boat over the past year. The Chief Executive of VSEL has been quoted as suggesting that cancellation would produce savings of no more than £250 million. Any such figures are by their nature hypothetical, since cancellation would involve a number of renegotiations of contracts, not only with VSEL, but also with contractors providing the nuclear power plant, and the strategic and tactical weapons systems. MoD confirmed that its estimate covered all capital, but not personnel, costs.[10]

Strategic weapon system

34. The Trident D5 missile is a three stage solid fuel ballistic missile, over 44 feet in length and 83 inches in diameter, with a throw weight of 135,000 lb and a range of over 4,000 nautical miles at its full payload, or up to 6,000 nautical miles with a reduced number of warheads. Her Majesty's Government has not stated how many warheads the UK missile will carry, but has made it clear that it will be less than the maximum possible number.

35. The arrangements for the UK purchase of Trident D5 missiles are based on the 1963 Polaris agreement. The UK regularly provides the US Strategic Systems Program with a schedule of requirements;[11] the Strategic Systems Program then makes the contractual arrangements with the US producers. In 1982, the British Government agreed with the US authorities that British Trident missiles would be processed with those of the United States at King's Bay, Georgia. This means that the UK will take its missiles from a shared pool held at King's Bay and, when an SSBN is ready for her long refit, the missiles will be returned to King's Bay for servicing.[12] As we have reported previously, although specific missiles in the King's Bay pool will not be identified as UK property, the UK Government will take title to the missiles it purchases; it will possess full information about the effectiveness and serviceability of its operational missiles. Although the missiles will normally remain in the submarines for the full length

[1] Qq 2096, 2099.
[2] Q2096.
[3] Q2100 and note by witness.
[4] Q2102; Evidence, p 35, para 5.
[5] Qq 2103–5.
[6] 1991 Report, para 26; also 1990 Report, para 26.
[7] 1990 Reply, para 4.
[8] 1991 Report, paras 27–28.
[9] Q2061: also Q2046.
[10] Qq 2061–8.
[11] Q2125.
[12] 1988 Report, paras 104–105.

of each commission, emergency facilities exist should it prove necessary for whatever reason to remove and preserve a submarine's missile load.[1]

36. The cost of the missiles is now estimated to be £988 million, all of which is to be spent in the United States.[2] This represents a reduction of £838 million, or almost 46 per cent against the 1981 estimate, arising only in part from the decision to process the missiles at King's Bay. MoD estimates that further savings equivalent to about 5 per cent of the current cost would have been achieved, had it not been for the recent changes made in the US Trident II D5 missile programme.[3] The cost of £988 million is £24 million more in hybrid prices than last year's figure. There has been a reduction of £42 million in the contingency programme for the strategic weapon system, in line with the broad trend over the programme as a whole.

37. We reported last year that the UK's planned buy of D5 missiles for 1991 had been deferred for a year and was being included in the production order for US Fiscal Year 1992.[4] MoD has confirmed that this was done and that 23 missiles were purchased in Fiscal Year 1992.[5] Over the same period, the US Congress granted some $977 million for the procurement of 28 Trident II D5 missiles and related costs.[6] Changes in the US D5 procurement programme have led to some increase in the UK's costs. MoD told us that the US Navy decision to defer until 1998 its programme to retrofit D5 into existing Trident I C4 hulls will give a gross cost increase of the order of $105 million (£66 million), although offsetting savings had been identified elsewhere in the SWS programme.[7] These savings consist of around £20 million in missile processing costs at King's Bay, "other minor savings" of £20 million and £42 million from use of contingency funds.[8] The last-named is not a saving. The Ministry does not seem unduly concerned at the effects on the UK programme of the recent changes in the Trident II D5 missile programme, nor, apparently, is the US seeking to alter the UK's buying pattern to make up for the reduced US requirement.[9]

38. Procurement of missiles is being phased to meet UK missile outload dates; subject to this consideration the procurement programme is kept under review to ensure that requirements are met in the most cost-effective manner.[10] Although the Government has confirmed information published by the House of Representatives Armed Services Committee relating to the UK planned buy of 23 D5 missiles for Fiscal Year 1992,[11] the UK planned total buy of missiles remains confidential.[12] We remain unclear from whom this information is being safeguarded. It makes no sense to suggest that "it would reveal information about the overall size of the force":[13] the necessary element of uncertainty relates to warheads and not missiles. **We welcome the Ministry's agreement to reconsider the classification of the period of time over which the missiles are to be purchased, and recommend that it also reviews classification of the total UK missile buy.**

39. The Secretary of State has reported that, as in previous years, delivery, installation and testing of the Strategic Weapon System equipment for the Vanguard class submarines is proceeding to schedule.[14] Strategic weapon system equipment is now estimated to cost £1,168 million, 28 per cent below the 1981 estimate of £1,621 million; all the savings arise on the US expenditure which still accounts for around 90 per cent of the programme. The non-missile elements of the strategic weapon system — the navigation, fire control and launcher sub-

[1] *ibid*, para 109; 1989 Report, paras 42–43.
[2] Evidence, p 25, Answer 1, Table b.
[3] *ibid*, A16b.
[4] 1991 Report, para 35.
[5] Evidence, p 28, A14.
[6] *ibid*.
[7] Evidence, p 29, A16a; Q2131.
[8] Q2124.
[9] Qq 2126–2130.
[10] Evidence, p 28, A14.
[11] Evidence, p 29, A15.
[12] Qq 2116–2123.
[13] Q2117.
[14] Evidence, p 23, para 3; 1991 Report, Evidence, p 17, para 3.

systems — seem to have been relatively trouble-free parts of the Trident programme.[1]

Tactical Weapon System

40. We have reported in some detail over past years on problems experienced in the development of the tactical weapon system (TWS) for Trident submarines.[2] These problems primarily concern the sonar suite, the Submarine Command System (SMCS) and their integration in the Shore Development Facility (SDF). After initial reluctance, MoD has been commendably full and open in setting out the difficulties consequent on the complexity and sophistication of the systems, and reporting on progress made. In his report to the House this year, the Secretary of State said that the development of the submarine's TWS was making "steady progress", with final testing and integration underway in the SDF and in VANGUARD.[3] Evidence to us referred to "substantial progress" over the past year in resolving the outstanding problems.[4] **The cumulative delays and problems of the last four years mean that there is very little contingency left in the programme. Nonetheless, MoD is confident that the overall requirements of the programme will be met.**

41. In 1991, MoD told us in some detail of the problems which had arisen over the development of SMCS software.[5] MoD planned to use successive issues of SMCS software to provide "progressively enhanced system capability", and initial issues had already been demonstrated successfully at the SDF. Two further issues were planned for 1991, the second one to support VANGUARD's contractor sea trials.[6] The Secretary of State's report stated —

> "The second issue of the software to be used by the Submarine Command System (SMCS) is now being tested, but there is now very little contingency remaining in the SMCS development programme".

MoD has told us that this second issue of software "did not include adequate performance to support Contractor's Sea Trials",[7] and that it had been necessary to restructure the issues of software needed to support the later programme and to redefine the functionality of some issues.[8] There will be two further main issues, with two interim issues of the first of these, and one of the second. It was recognised in 1986 that it might not be possible to achieve full capability in the command system for VANGUARD's initial deployment and that it would be possible for submarines to operate "using the manual systems they have used for many years past", but Rear Admiral Pirnie thought that such an eventuality was "extremely unlikely" and was confident that there would be no repetition of the Type 23 frigate command system saga.[9] The timely issuing of the submarine command system software remains risky.

42. The Secretary of State's report stated this year that —

> "Since the last report, significant progress has been made towards resolving the remaining development issues with the Sonar Suite, and the final design review of the system was held in the autumn".[10]

MoD has told us that solutions have been found to all the major development problems in the inboard equipment, including the only problem identified in 1991 as of major significance,[11] and to new problems which emerged during

[1] 1990 Report, Evidence, p 60, A15 et al.
[2] e.g. 1990 Report, paras 30–33; 1991 Report, paras 39–41.
[3] Evidence, p 23, para 4.
[4] Evidence, p 28, A12.
[5] 1991 Report, p 27, A14b.
[6] *ibid.*
[7] Evidence, p 28, A13a, b; p 23, para 4.
[8] Q2111.
[9] Qq 2111–3; see Tenth Report from the Defence Committee, *The Vertical Launch Sea Wolf Missile System and the Type 23 Frigate Command System*, HC 409 of Session 1988–89; and Fourth Report from the Defence Committee, *Further Examination of Defence Procurement Projects*, HC 432 of Session 1990–91, paras 4–16.
[10] Evidence, p 23, para 4.
[11] 1991, Evidence, p 22, A14a(ii).

testing and integration in the SDF. The sonar suite has been successfully set to work on board VANGUARD, and final design reviews of individual equipments and the system as a whole have been completed. The design certificates for the 2054 sonar will be signed off shortly.[1] The slippage to the Sonar 2054 development contract, estimated in 1989 to be fourteen months behind target, in 1990 to be two years, and in 1991 to be two years and nine months, was estimated in written evidence to be "in the region of three years",[2] and now nearer four years.[3] Rear Admiral Pirnie told us that this did not present any programme risk to Trident, and that the contract was still expected to come in near the target price.[4]

43. In February 1990, MoD expected that, despite delays in the sonar development programme and delivery of SMCS equipment, there would be a lead time of at least one year between starting an integration activity in the SDF and beginning the same activity in VANGUARD, and that the final trials of the total system would be started a year before final full trials on VANGUARD.[5] Full integration testing in the SDF was expected to be completed "in the first half of 1991".[6] By February 1991, MoD expected full integration testing of the TWS in the SDF to be completed "early in 1992", five months in advance of the comparable trials in VANGUARD.[7] MoD has now told us that design deficiencies in the TWS equipments revealed in integration testing have delayed full integration of the system in the SDF to the summer, and that the lead time over equivalent testing in VANGUARD has been reduced to one month, with full Harbour Trials taking place in both early in the summer of 1992.[8] It is however still able to conduct trials before VANGUARD does.[9] This means that, if further deficiencies are revealed at this stage, which must be regarded as by no means improbable, there will in effect be no lead time between activities in the SDF and on VANGUARD. Rear Admiral Pirnie told us that it was extremely unlikely that contractor sea trials would be delayed. This may therefore mean VANGUARD undertaking early sea trials without a fully functional command system.

44. Some useful lessons have been learned from the problems over the tactical weapon system and in particular over the benefits of contractual management of interfaces, a lesson which is being passed on to those managing the follow-on to the Trafalgar class of submarines.[10] There has evidently been better progress over the past year than in recent years. The Secretary of State's report states that—

> "The TWS production programme remains on schedule to support VANGUARD's deployment".[11]

Rear Admiral Pirnie warned that —

> "it will not be until we get the submarine into the water and on trials that we will be fully confident we have got those interfaces correct . . ."[12]

Estimated costs of the TWS have risen in 1991–92 prices from £613 million in 1981 to the current estimate of £890 million, over 45 per cent. Although costs are under control, further increases may be necessary.[13] **There is little or no contingency left in the tactical weapon systems programme as a whole, or in a number of its constituent parts. It remains a principal area of concern both technically and financially.**

[1] Q2109.
[2] Evidence, p 28, A13.
[3] Q2109.
[4] *ibid.*
[5] 1990 Report, para 32.
[6] Evidence, p 60, A13(c).
[7] 1991 Report, para 41 and Evidence, p 22, A14(c)(i).
[8] Evidence, p 28, A12, A13c; Q2111.
[9] Q2111.
[10] Q2115.
[11] Evidence, p 23, para 4.
[12] Q2114.
[13] *ibid.*

Warhead

45. Work at AWE remains on schedule to meet the first warhead deliveries, due at the end of 1992 and subsequent deliveries as required.[1] The production of fissile material is continuing in the existing facilities and the commissioning of new facilities is proceeding in line with the programme.

46. The A91 building at AWE Aldermaston is designed to remove low level radioactive contamination from waste water discharged from the site. It was handed over in 1989 for commissioning work, which was stopped in March 1991 following the discovery of leaking stainless steel pipework and filter vessels. In response to our request for information, MoD submitted a most helpful memorandum.[2] It is stated therein that the corrosion discovered has been attributed to "a synergistic combination of chloride and microbiological induced effects", and further studies have been initiated. Meanwhile, the necessary action involving extra maintenance work[3] has been taken to ensure that existing waste treatment facilities can continue to operate effectively and safely. There will be no impact on the production of warheads for the Trident programme.[4] The Secretary of State's report stated that "the bulk of the new production facility (A90) has been handed over . . .".[5] MoD has told us that all those parts required to support warhead production have been handed over; other parts were never intended to be completed in the same timescale.[6] Given the difficulties over the capital works programme at Aldermaston on which we have reported in detail in earlier reports,[7] and most recently on the ductwork,[8] it is of course regrettable that there should have been yet further, if unrelated, problems. It does not however seem as if these will have any impact on the Trident programme.

47. There has been a sharp fall in vacancies, particularly among industrial personnel, although there are still 139 vacancies for specialists at AWE as a whole, as against 215 in 1991, with the main areas of recruitment difficulty being electrical design engineers, chemical engineers and metallurgists.[9] Mr Beaven, Deputy Controller (Nuclear), attributed this to a number of factors, including the recession, and further reductions in the manpower ceilings.[10] The interim contractor has also completed a review of pay and conditions with a view to ensuring that in the longer term staff numbers are stabilised and recruitment maintained. After a period of little change, it would seem that a number of changes to current terms and conditions may be in prospect.[11]

Shore construction

General

48. The analysis of Trident works expenditure is complicated by the system of dividing such costs into those directly attributable, and those which might have been required in any event, but which will be part of the support for Vanguard class submarines.[12] There have been about 110 Trident-related works projects.[13] Most of the contracts were let in the 1980s,[14] and expenditure is now at a peak. The 1991 Supply Estimates listed nine major Trident works projects—five at Faslane (shiplift, Northern Utilities Building, Finger Jetty, Support Buildings, Dockside Cranes) and four at or for Coulport (Jetty Foreshore, Ready Issue Magazine, Generating Station, Explosives Handling Jetty).

[1] Qq 2224–5.
[2] Evidence, p 33, A32.
[3] *ibid*: Q2218.
[4] Q2217.
[5] Evidence, p 23, para 5.
[6] Q2220.
[7] 1988 Report, paras 63–74; 1989 Report, paras 68–69.
[8] *ibid* and 1990 Report, paras 47–48.
[9] Evidence, p 32, A30.
[10] Q2221.
[11] Evidence, p 33, A31: Qq 2222–3.
[12] See para 10 above.
[13] 1990 Report, para 34.
[14] 1988 Report, para 50.

TABLE V

	1982 £m	*1985* £m	*1986* £m	*1987* £m	*1988* £m	*1989* £m	*1990* £m	*1991* £m	*1992* £m
Construction	N/A	618.00	N/A	945.00	753.00	883.00	1,259.00	1,376.00	1,556.00
Attrib. to Trident	N/A	396.00	N/A	N/A	410.00	491.00	629.00	733.00	863.00
Contingency	N/A	110.00	N/A	N/A	150.00	101.00	59.00	68.00	57.00
PSA	N/A	70.00	N/A	75.00	94.00	104.00	118.00	153.00	217.00
Price variation	N/A	N/A	N/A	N/A	3.00	12.00	61.00	79.00	157.00†
Total Trident only	602.00	576.00	691.00	671.00	657.00	708.00	867.00	1,033.00	1,325.00
Total programme estimate	7,520.00	9,285.00	9,869.00	9,265.00	9,043.00	9,089.00	9,380.00	9,863.00	10,518.00
Works programme attributable to Trident as a % of the total programme	8.00	6.20	7.00	7.24	7.26	7.78	9.24	10.47	12.59

†Including £31m for Functional Machinery.

49. The costs of the attributable works programme have not risen dramatically in the past seven years. In 1990, we reported a rise in costs, attributed by MoD to the imposition by the EC of VAT on construction, and the higher than average inflation in the construction industry.[1] MoD told us in 1991 that there had been only a seven per cent increase in real terms in the works programme since the revised estimate published in 1984, which stood up "fairly well in comparison with other complex projects".[2]

50. In the course of 1991–92 there was a further real cost increase in shore construction of £145 million, bringing shore construction up to a total of £1,188 million, or 12 per cent of the total Trident programme. That £145 million increase is primarily attributable to two factors: an increase of around £70 million at Coulport, as a result of the renegotiated Explosives Handling Jetty contract (see below), and an increase of £57 million in PSA Resource Costs.[3] These are now estimated to total £217 million,[4] having more than doubled since 1989. 85 or 90 per cent of these costs is composed of consultants' fees.[5] In 1988 we were told that these costs arose —

> "from a technically very complex programme with consequential effects on design work, on the need for modelling, for safety and availability and the problems of coordinating an exceptionally large number of contractors on one site".[6]

The Assistant Under Secretary of State (Fleet Support) told us this year —

> "We are at a stage of the programme where the requirements of the nuclear safety case, as we move from straight construction into the commissioning phase, are biting much harder... The final stages of the project require production of a good deal of documentation, in terms of operating manuals and that sort of thing".[7]

While we well understand the requirement to pay the going rate for such fees, however high, we are astonished that over 18 per cent of the Trident works programme should be spent on consultants' fees. We are also disturbed that the original estimate of fees should have proved so wrong: officials candidly

[1] 1990 Report, para 35; Qq 422–428.
[2] 1991 Report, para 42.
[3] Q2150.
[4] Evidence, p 30, A22b, note b.
[5] Q2155; 1988 Report, Evidence, p 21, A20.
[6] Ibid.
[7] Qq 2151–2.

accepted that planning had been faulty in that the level of fees had not been fully foreseen.[1] From our discussions, we suspect that some of this arose from the "fast-track" method of construction, meaning that construction is proceeded with before designs are complete.[2] This makes it increasingly difficult to construct an iterative safety case, since the designs change as fast as the documentation, modelling and analysis on the previous design is produced. **We recommend that lessons be drawn from the ever rising level of professional fees, and that guidelines be promulgated by the Defence Works Services organisation.**

Management

51. Early in 1991, MoD commissioned Bovis Construction Ltd to carry out an independent technical audit of the programme.[3] The report was received in March 1991. MoD has told us that the report's principal recommendations were that:

— the PSA should be retained in the project management role;

— the existing management arrangements should not be dismantled but those between MoD and PSA should be strengthened to reflect the changed relationship between the Departments, which now requires a more active involvement by MoD in the project management;

— there should be an enhancement to the engineering expertise available in the MoD client organisation;

— there should be very strict controls on further changes in the design of works facilities.[4]

The Government accepted the recommendations and has taken a number of steps to provide for an improved control regime, notably:

— a virtual design freeze across the programme;

— a strengthened MoD presence on-site, consisting of a team of 40 technical, financial and administrative personnel under a professional engineer, who has delegated authority to give prompt responses to the majority of PSA proposals;

— improved management and monitoring arrangements.[5]

52. MoD regard the "frank and comprehensive" report produced as "extremely helpful", and most of the recommendations have now been agreed and implemented.[6] To some extent, the changes are in parallel with the new procedures being introduced by MoD consequent on its untying from PSA. The Defence Works Services organisation has issued notes for guidance on some of the lessons learned from the Trident works programme.[7] Ministers have chosen to regard the Report as an integral part of the internal advice presented to Ministers on this subject, and therefore have refused our request for a copy even under the usual conditions governing commercially sensitive documents.[8] The Government's 1991 Reply stated that "commercial sensitivity precluded publication of the detailed conclusions".[9] In 1990, we concluded that it was "unsatisfactory" that a request for a similarly commissioned external report by Lord Tombs into the future of production and engineering tasks at AWE, should have been similarly refused on grounds of advice to Ministers. **We regret that MoD has been unwilling to release more of the detailed proposals made in the Bovis Report, or to make a confidential copy of the Report available to us. We nevertheless welcome MoD's initiative in commissioning the Report, and in acting so quickly on its recommendations, and we hope that the lessons learned will be used by MoD**

[1] Q2156.
[2] Q2157.
[3] 1991 Report, para 43: Evidence, p 23, para 6 and p 30, A24.
[4] First Special Report of Session 1991–92, HC 27, para 10.
[5] Evidence, p 30, A24.
[6] *ibid*: Q2160.
[7] Q2161.
[8] *ibid*.
[9] 1991 Reply, para 10.

as it moves towards a new relationship with PSA, and as a major public works programme in connection with forces restructuring starts in 1992–93.

USA

53. Given that the US Navy operates Trident submarines in both the Atlantic and Pacific oceans, from two operating bases, it might be thought that some of the snags encountered in the UK Trident shore construction programme could have been avoided by drawing more fully on US experience. MoD witnesses fairly drew attention to the differences in topography and environment which make imitation difficult. The USN facility at King's Bay, Georgia is in effect built on sand, so that graving docks were possible, which the geography of Faslane ruled out.[1] Similarly, the explosives handling jetty at Coulport has to float because of the steeply shelving cliff edge, while the equivalent US facility is a more conventional piled jetty.[2] A number of the facilities are however similar, and the specifications of those for handling of the pooled missiles have in effect to be defined and approved by the US Navy. PSA visited King's Bay in the early stages. **It would seem that the management of the shore construction programme took full account of parallel US experiences.**

Explosives Handling Jetty

54. An Explosives Handling Jetty (EHJ) is required at Coulport for the berthing of submarines, and the subsequent loading and unloading of the missiles' re-entry stages fitted with nuclear warheads. The Jetty is formed of two vast floating concrete pontoons under a high steelwork roof, with two overhead cranes. It will be moored to the foreshore at Coulport by four metal booms. The EHJ is under construction ashore at Hunterston, for want of a suitable site at Coulport, and on being floated off will be towed the 20 miles to its berthing place. The structure is as long as an *Invincible* class aircraft-carrier, and four times heavier.

55. Tenders for the EHJ were invited in 1987. MoD told us in 1990 that the timetable was very tight, as a result of additional construction work to meet the nuclear safety case, and adverse weather at Hunterston.[3] In 1991, further slippage was reported, and a delay in the ready for handover date: MoD told us that they were reviewing the programme and considering whether to advance it.[4] The Minister told the House in July 1991 that the "whole apparatus will have to be strengthened more than was originally envisaged":[5] it has also been stated that there had been around 100 significant design alterations in the short life of the project.[6] A revised contract was signed in August 1991, and the Secretary of State has told the House that good progress is being made against the new programme.[7] Commissioning is now due in November 1992, a year later than planned, but still within the timescale necessary to meet the requirements of the Trident programme.[8] Rear Admiral Davis, Director General (Fleet Support) Policy and Services, was also confident that the nuclear safety case would be successfully made. Its current estimated cost is around £220 million; of the increased cost of the EHJ over the past year, about 70 per cent can apparently be attributed to the effects of the August 1991 contract renegotiation.[9]

Faslane Finger Jetty

56. The finger jetty at Faslane has been constructed next to the shiplift for submarines to moor alongside. The jetty is constructed on piles, similar to those supporting the shiplift, but driven direct into the clay layer: these have not therefore had to be tested as were the shiplift piles.[10] There have been some

[1] Qq 2162–4.
[2] *ibid.*
[3] 1990 Report, Q416.
[4] 1991 Report, Q84: HC Deb, 2 July 1991, cols 156–7*w*.
[5] *ibid.*, col 157*w*.
[6] HC Deb, 31 January 1992, col 727*w*.
[7] Evidence, p 23, para 6.
[8] *ibid.*, p 32, A27: Q2170.
[9] Qq 2166, 2178–9 and note by witness.
[10] 1988 Report, para 54; Q2191.

problems, primarily over the crane, leading to slippage in the in-service date, and a substantial increase in cost. The 1991 Supply Estimates showed an increase from £24.7 million to £39.7 million, and a rather optimistic estimate of completion in 1991–92. A note on the Estimates referred to revised estimates "reflecting increased safety requirements". There have however been no significant cost increases this year.[1] The principal problem has been to design a 125 tonne crane strong enough to meet the safety case, but light enough to be supported by the jetty.[2] This problem has apparently been solved. The crane, now likely to weigh as much as 1,200 tonnes, is being assembled off site and brought in sections to reduce the delay.[3]

Faslane Shiplift

57. We set out in our 1990 Report a number of matters in connection with the shiplift under construction at Faslane, on which we had also reported in earlier Reports.[4] In our 1991 Report we examined in some detail the implications of the failure of many of the raker piles on which the shiplift rests. While satisfied that suitable steps have been taken to ensure the reliability of the piles on which the safety case will depend, we expressed a number of detailed concerns. The Government accepted our recommendations, including a study of the potential long term effects of corrosion on the piles[5] and confirmed that the lessons of this project had indeed been learned.[6] Notes of guidance have been issued within MoD, including "specific advice on the application of quality control and arrangements for commissioning...".[7] MoD went on to state that —

> "Work continues to ensure that the facility is completed and a satisfactory safety case established so that it will be available for the first lift of a nuclear submarine".[8]

Magnetic Treatment Facility

58. The floating Magnetic Treatment Facility (MTF) was intended to remove by magnetic treatment the permanent magnetic signature acquired by steel vessels during construction. It was originally conceived as a sort of floating berth at Faslane into which a submarine would be manoeuvred to have its signature measured, and then to demagnetise it by extremely high magnetic fields.[9] Polaris submarines are treated for magnetic signature at Number 2 berth at Faslane, which is too small for Vanguard class boats.[10] All four contractors who responded to the invitation to tender proposed a "drive-in" facility, which met the requirement for a very rapid turn around time, and which replicated in some degree a USN facility already in operation.[11] The contract was let in April 1989 at a cost of £47 million to Dowty Defence and Air Systems. Tarmac were responsible for civil construction and Vosper Thorneycroft for the berth. Because of the amount of Procurement Executive (PE) equipment involved, the project was managed as a "hybrid" project, without PSA involvement, although with the advantages of a single prime contractor and an overall project manager.[12] In 1991 MoD told us that the MTF was experiencing delays, and that having "encountered some doubts about the specification", a separate design evaluation study had been let.[13]

59. On 25 June 1991 MoD informed us that this study had highlighted a considerable increase in the expected cost and a likely delay of 18 months to its ISD.

[1] Qq 2185–6.
[2] Qq 2180, 2184, 2189.
[3] Qq 2182, 2189.
[4] For details, see 1991 Report, paras 44–48.
[5] 1991 Report, para 55 and 1991 Reply, para 16.
[6] 1991 Reply, paras 12–19.
[7] Evidence, p 32, A29a.
[8] *ibid*, A29b.
[9] 1990 Report, Evidence, Q418–419.
[10] Q2192.
[11] Q2216.
[12] Qq 2202–3, 2210–2212.
[13] 1991 Report, para 60 and Q126.

"In view of these findings, and the results of further studies into lower cost and operationally adequate alternative methods of controlling magnetic signatures, the Department has concluded that to press ahead with this facility would not represent the most cost-effective use of resources".[1]

The design and build contract was therefore cancelled on 24 June 1991.[2] MoD told us that it was determining "the best alternative method of treatment for the Vanguard class and other RN submarines".[3] The subsequent written answer also referred to the alternative means being "less environmentally obtrusive", and confirmed that the decision would not affect the programme for the deployment of Trident submarines.[4]

60. Expenditure on the MTF to date has been of the order of £15.3 million, representing 23 per cent of the original estimated cost, together with £1.8 million for the design evaluation study, and £3 million on account against final settlement.[5] No penalty costs were incurred as a result of the cancellation, but MoD is required to reimburse the contractor for "all reasonably and economically incurred costs",[6] and negotiation is continuing.[7] The design evaluation study suggested that continuing with the programme could have raised the eventual final cost from £65 million to around £150 million.[8] **Cancellation at this stage would seem to have been a prudent step in all the circumstances.**

61. MoD told us that work had been halted in September 1990 —

"following the discovery that the water current at the chosen site was more complex, with a significantly stronger maximum level, than had been assumed when the contract specification was drawn up".

The results of the design evaluation study, submitted to MoD in May 1991, showed that —

"a major redesign would have been necessary to produce a structure capable of withstanding a stronger water current and the consequently increased docking forces by vessels during treatment".[9]

62. The original intention had been to site the facility 25 metres from the sea wall at Faslane, where the water current was around 0.1 metres per second.[10] This figure of 0.1 metres per second was included in the cardinal points specification which went out as part of the invitation to tender.[11] It was subsequently decided that there was a possibility that the steel piles in the dock wall might interfere with the operation of the facility.[12] A decision was therefore made that "a better location would be in the middle of the loch 305 metres offshore".[13] This decision, and the assumptions made at the time, are at the root of the trouble. **There is no reason to assume that the facility would not otherwise have proceeded as planned. MoD should therefore explain why the likelihood that the steel piling of the Faslane sea wall would interfere with a complex magnetic facility had not been explicitly addressed at the time of the invitation to tender.**

63. When the decision was made to shift the planned facility into the middle of the loch, an assumption was made by PE officials that the water currents there

[1] Evidence, p 39: Q2193.
[2] Q2213.
[3] Evidence, p 39.
[4] HC Deb, 26 June 1991, col 496*w*.
[5] Evidence, p 31, A25a: HC Deb, 23 January 1992, col 337*w*; Q2213.
[6] Q2213.
[7] Evidence p 31, A25b.
[8] *Ibid*, A25c.
[9] *Ibid*, A25d.
[10] Q2193.
[11] Q2213.
[12] Q2197.
[13] Q2196.

would be the same as at the dockside.[1] The current has subsequently been found to be from four to six times as fast, and considerably more complex.[2] This assumption was described by Mr Hawtin as "a genuine and unfortunate mistake".[3] But he also told the Committee that the assumption —

> "was based on the knowledge that prevailed at the time of the experience over many years of operating in the Gareloch and on the wind, tide and other such tables. The sad fact is there was no reason, it was judged, to believe the current was vastly different out in the middle. The location is well towards the head of the loch...".[4]

The PE officials made the assumption after they had consulted the authorities and operators on the spot:[5] and the view at the time was that —

> "since the location was up towards the head of the loch the currents would not be markedly different".[6]

64. **We can only express astonishment that, not only did PE officials charged with oversight of a self-evidently complex and challenging project make unfounded assumptions on matters of which they could not be expected to have direct experience, but also that those on the spot at Faslane, with years of experience of operations in the Gareloch, were apparently consulted and did not question these assumptions.** Mr Hawtin told us that in future industry would be made responsible for such matters as measuring the current, as part of the general policy of paying contractors to take the risk.[7]

65. The project would not of course have been cancelled without some alternative means of deperming being available. A decision is expected "shortly" on an interim system for initial magnetic treatment of the first Vanguard class submarines: experience gained with this proposed interim system will be taken into account in deciding on a longer term solution for Vanguard and other RN submarines.[8] It seems that the interim solution will be to use traditional manual close wrap methods alongside Number 10 berth at Faslane: and that this could well prove to be the longer term solution, given the fall in the number of other submarines requiring treatment and the reduced urgency of ensuring a fast turn around time.[9]

66. Mr Hawtin told us in conclusion that the interim solution based on the manual close wrap methods would be a most cost effective way of meeting what seems to be a revised requirement. At £4 million it is certainly massively cheaper.[10] **The serious mistake over currents may prove with hindsight to have been a blessing in disguise.** There are however several issues to which we expect our successor Committee to return:

- the basis for the original decision to procure a drive-in facility rather than to continue current close wrap procedures;
- the assessment made prior to award of the contract of the effect of the proximity of the steel elements of the Faslane sea wall;
- the exact nature and outcome of the consultation by the Procurement Executive of those with direct experience of the Gareloch's currents;
- the reason for the apparent change of requirements for the turn-around

[1] *ibid.*
[2] Q2198.
[3] *ibid.*
[4] Q2198.
[5] Q2206.
[6] Q2208.
[7] Q2227.
[8] Evidence, p 31, A25e, f.
[9] Qq 2215–16.
[10] Q2216.

time, which renders the close-wrap technique an acceptable solution, at least in the interim; and, most importantly,

— the possibility that several other major works projects associated with the Trident programme, which have not been subject to the same errors of judgment as the Magnetic Treatment Facility, and which have therefore been completed, could likewise have been substituted by less dramatic and more cost-effective solutions as a result of changed requirements and a smaller submarine fleet.

Coulport

67. Most of the works at Coulport would seem to be proceeding well and broadly to timetable. During our visit in February 1992, we were able to see the Ready Issue Magazines and the extensive works on the foreshore, as well as the impressive security arrangements. In 1991 MoD noted in evidence to us that the Generating Station at Coulport was experiencing delay and was under review, although the delays were unlikely to have an effect on the Trident programme overall.[1] This year, MoD told us that the contract strategy for the Generating Station had been revised, under the guidance of the lead consultant, who is —

> "also actively involved in assisting the contractor with managing the commercial documentation and the drawings necessary for handover".[2]

In oral evidence, Rear Admiral Davis attributed the problems with the generating station mainly to the performance of the original contractors.[3] Costs have risen by about £10 million over the past year, and the programme timetable is very tight.[4]

Rosyth

68. There are two principal Trident related works projects at Rosyth: RD57, the nuclear refitting and refuelling facility, and RD46, the SSBN Docking Facility in the entrance lock of the dockyard. MoD told us in 1991 that work on RD46 had started on site in May 1990, and that the associated dredging was due to start in the summer of 1991.[5] Similarly, RD57 was said to be progressing well, with Phase 2, the land reclamation and dock excavation due to finish in the summer of 1991. This was on a contract let to Tarmac Construction in May 1989 for £12.4 million.[6] The contract for Phase 2B, for enabling works was placed in October 1991.[7] The main contract, Phase 3, is due to be placed "in the first part of 1992".[8]

Barrow

69. There have also been works at Barrow which we would have thought were entirely attributable to the Trident programme. MoD told us in response to our query that —

> "It has always been recognised that the Barrow exit was not sufficiently deep to permit the safe passage of a vessel with the draught of the Vanguard class submarine. Dredging of the channel represented the most cost effective means of overcoming this constraint".

The cost of this dredging, currently assessed on an unclassified basis as "some £40 million", is borne by MoD.[9]

VI. AWE

General

70. The warhead for Trident is designed and manufactured by the Atomic Weapons Establishment (AWE). In several past reports, we have drawn attention to manpower and management problems at Aldermaston and Burghfield. In

[1] 1991 Report, Evidence, p 26, A31A and Q126.
[2] Evidence, p 32, A28.
[3] Q2173.
[4] Qq 2174–6.
[5] 1991 Report, Evidence, p 29.
[6] 1990 Report, p 61, A21.
[7] Evidence, p 30, A23.
[8] 1991 Report, Evidence, p 29.
[9] Evidence, p 31, A26; Evidence, p 36.

December 1989, the Secretary of State proposed to the House full-scale contractorisation of AWE, subsequently passed into law as the Atomic Weapons Establishment Act 1991. We reported on this in 1990.[1] Last year we reported that MoD regarded the interim contractor for the management of AWE, Hunting-BRAE as having made "a promising start" and that the contractor had confirmed that he could meet the programme within the current manpower ceiling.[2] The interim contract has now been in force for considerably over a year. The objectives set under the contract included the provision of senior and experienced management staff, in particular to improve manufacturing and site support activities, and the completion of three task price studies covering pay and conditions, long term manufacturing strategy and management information systems. Hunting-BRAE, the interim contractors, have seconded 20 staff to AWE and have introduced a revised management structure, with Directorates responsible for Operations, Site Engineering, Research and Development and Strategic Development. The last of these Directorates is responsible for managing the three task group studies, which were completed on schedule, with recommendations which have now been submitted for consideration. The other directorates have introduced a number of changes which are expected to lead to rationalisation and efficiency improvements. MoD sees the early signs as "encouraging" and is satisfied that AWE has —

> "continued to meet stringent safety and security standards whilst achieving its programme commitments including supporting existing in-service warheads, and the Trident programme".[3]

Safety and security

71. Safety and security have continued to be high priorities.[4] The Director, Safety is a member of the AWE Executive Board, and the contractor has introduced a new managerial position charged with "reviewing safety performance and proposing future developments". The security organisation and arrangements have remained unchanged.

Compliance Directorate

72. The Compliance Directorate provides overall management of the interim (or "Phase 1") contract, using among other means the assessment of milestone achievement, evaluation of performance related payments and monitoring and oversight of the Task Force studies. MoD intends to build on this experience to define the methods and organisation necessary to monitor full contractorisation and the Compliance Directorate has undertaken a number of tasks towards this objective, including co-ordination of tender documentation, co-ordination of changes such as pension arrangements and consultation with the Trades Unions.

Full contractorisation

73. MoD has recently drawn up a programme of "key milestones" towards full contractorisation of AWE.[5] The Invitation to Tender is due to be issued in summer 1992, with tenders due to be returned by September. It is intended that a decision should be taken, the selected contractor announced and the contract placed by January/February 1993, with full contractor operations beginning by 1 April 1993. **This is clearly a tight timetable. Sufficient time must be allowed for the tendering process to be conducted with all necessary attention to detail and to identifying and resolving potential problems before the contract is placed.**

Research and development

74. We noted that the report of the Committee of Public Accounts on *Ministry of Defence: Nuclear Research and Support Services*[6] identified a number of weaknesses in the management of nuclear research which paralleled those

[1] 1990 Report, paras 53–91.
[2] 1991 Report, para 66.
[3] Evidence, p 33, A33.
[4] *ibid.*
[5] Evidence, p 34, A34.
[6] 34th Report, Committee of Public Accounts, Session 1990–91, HC 415.

failings already identified in relation to the management of the capital works programme at AWE. **It seems clear that, over a period of many years, the Department consistently failed to exercise the degree of control and accountability in relation to the management of AWE that might have been expected. We accept that the introduction of contractor management initially into the capital works programme and subsequently to the establishment as a whole marked MoD's recognition of this weakness and a determination to rectify it, and hope that the Department will now move to a proper full "customer" relationship with AWE.**

75. At present, the AWE research programme is "structured to respond to MoD's requirements in a number of broad areas of work".[1] This suggests something less than the clearly defined targets which we would wish to see as part of a proper customer/contractor relationship. However, Hunting-BRAE are now implementing a Research Management Plan which will provide "detailed costed and resourced plans for the research programme over the next few years", bridging "the gap between broad assumptions and detailed plans".[2] MoD hopes that this will —

> "provide customers with a clearer picture of the objectives and rationale for the proposed AWE programme to fulfil MoD's requirements".[3]

Mr Beaven, Deputy Controller (Nuclear), told us that this would enable MoD in the future —

> "to make much more well explained and well reasoned decisions about what work we wish to carry on rather than what the establishment proposed to give us".[4]

76. Under the full management ("Phase 2") contract, customer-supplier arrangements will be brought into a "taut contractual footing" with research authorised as "a number of discrete well-defined packages". These will set out customer objectives, define the programme required and specify milestones, management arrangements, reporting and reviewing and other contractual requirements. **We repeat the view expressed in our last report that research should continue to receive adequate resources and a high priority in AWE's activities; but, within the context of this criterion, we welcome measures which will enable the Establishment to mount a more coherent research programme, directly flowing from the requirements of MoD.**

[1]Evidence, p 34, A35.
[2]Q2226.
[3]Evidence, p 34, A35.
[4]Q2226.

LIST OF TERMS AND ABBREVIATIONS

AWE	Atomic Weapons Establishment
EC	European Community
EHJ	Explosives Handling Jetty
ISD	In-service date
MoD	Ministry of Defence
MTF	Magnetic Treatment Facility
PE	Procurement Executive
PSA	Property Services Agency
RN	Royal Navy
RNAD	Royal Naval Armaments Depot
SDF	Shore Development Facility
SMCS	Submarine Command System
SSBN	A nuclear powered submarine armed with ballistic nuclear missiles
SSN	A nuclear powered submarine armed with conventional weapons
SWS	Strategic weapon system
TWS	Tactical weapon system
UK	United Kingdom
US	United States
USN	United States Navy
VSEL	Vickers Shipbuilding and Engineering Limited

ANNEX

LIST OF RELEVANT DOCUMENTS

Fourth Report from the Defence Committee, *Strategic Nuclear Weapons Policy*, HC 36 of Session 1980–81: and First Special Report, HC 266 of Session 1981–82.

First Report from the Defence Committee, *Statement on the Defence Estimates 1984*, HC 436 of Session 1983–84.

Sixth Report from the Defence Committee, *The Trident Programme*, HC 479 of Session 1984–85; and Third Special Report, HC 153 of Session 1985–86.

Second Report from the Defence Committee, *Statement on the Defence Estimates 1986*, HC 399 of Session 1985–86.

Third Report from the Defence Committee, *The Progress of the Trident Programme*, HC 356 of Session 1986–87: and First Special Report, HC 224 of Session 1987–88.

Third Report from the Defence Committee, *The Progress of the Trident Programme*, HC 422 of Session 1987–88: and Third Special Report, HC 674 of Session 1987–88.

Fifth Report from the Defence Committee, *The Progress of the Trident Programme*, HC 374 of Session 1988–89.

Ninth Report from the Defence Committee, *The Progress of the Trident Programme*, HC 237 of Session 1989–90: and Seventh Special Report, HC 661 of Session 1989–90.

Eighth Report from the Defence Committee, *The Progress of the Trident Programme*, HC 286 of Session 1990–91: and First Special Report, HC 267 of Session 1991–92.

National Audit Office, Report by the Comptroller and Auditor General, *Ministry of Defence Trident Project*, HC 237 of Session 1984–85.

Nineteenth Report from the Committee of Public Accounts, *The United Kingdom Trident Programme*, HC 348 of Session 1983–84.

National Audit Office, Report by the Comptroller and Auditor General, *Ministry of Defence and Property Services Agency: Control and Management of the Trident Programme*, HC 27 of Session 1987–88.

Minutes of Evidence taken before the Committee of Public Accounts, *The Torpedo Programme and Design and Procurement of Warships, Control and Management of the Trident Programme*, HC 189-i of Session 1987–88.

Thirty-Fourth Report from the Committee of Public Accounts, *Ministry of Defence: Nuclear Research and Support Services,* HC 415 of Session 1990–91.

PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT

WEDNESDAY 11 MARCH 1992

Members present:

Mr Michael Mates, in the Chair

Mr John Cartwright	Mr John Lee
Mr Churchill	Mr John McFall
Mr Bruce George	Mr John McWilliam
Mr John Home Robertson	Mr Neil Thorne
Mr Michael Knowles	

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 76 read and agreed to.

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

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

[Adjourned to a day and time to be fixed by the Chairman.

LIST OF WITNESSES

Wednesday 11 March 1992

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MR BRIAN HAWTIN, Assistant Under Secretary of State (Material/Naval), REAR ADMIRAL IAN PIRNIE CB, Chief Strategic Systems Executive, MR DAVID HEYHOE, Assistant Under Secretary of State (Fleet Support), MR GEOFFREY BEAVEN, Deputy Controller (Nuclear), MR ALAN PHIPPS, Principal Director of Navy and Nuclear Contracts and REAR ADMIRAL GRAHAM DAVIS, Director General Fleet Support, Policy and Services, of the Ministry of Defence . . 1

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TAKEN BEFORE THE DEFENCE COMMITTEE

THURSDAY 5 MARCH 1992

Members present:

Mr Michael Mates, in the Chair

Mr John Cartwright
Mr Churchill
Mr Bruce George
Sir Barney Hayhoe
Mr John Home Robertson
Mr John McFall
Mr Neil Thorne

Examination of Witnesses

MR BRIAN HAWTIN, Assistant Under Secretary of State (Material/Naval), REAR ADMIRAL IAN PIRNIE, CB, Chief Strategic Systems Executive, MR DAVID HEYHOE, Assistant Under Secretary of State (Fleet Support), MR GEOFFREY BEAVEN, Deputy Controller (Nuclear), MR ALAN PHIPPS, Principal Director of Navy and Nuclear Contracts, REAR ADMIRAL GRAHAM DAVIS, Director-General Fleet Support Policy & Services, Ministry of Defence, examined.

Chairman

2012. Mr Hawtin, gentlemen, good morning. Thank you for coming, well supported, to help us with our routine annual update with the progress of the Trident programme. Can we start off, please, with a general question on costs. The unallocated contingency is now about £356m with £210m in addition allocated to elements of the programme, a total of £566m; that compares with £726m last year, £877m in 1989-90, and £1.1bn in 1988-89. While contingencies of course are there to be used, are you happy that you have enough in hand with that amount of reduction in contingencies when only half way through the expenditure?

(Mr Hawtin) Thank you, Chairman. The short answer is, yes. Every year we assess the level of financial risk inherent in each element of the programme. That is done very carefully and in depth, and we then look at the programme as a whole and set what we consider are the appropriate levels of contingency. It might be helpful to the Committee if I just highlighted the main elements of the programme which we took into account in setting this year's contingency levels, and they are that: the Trident programme continues to make very good progress and remains both on schedule and within budget. The construction of all three submarines on build contract is progressing well and on schedule. As you know, the roll-out of VANGUARD from the Devonshire Dock Hall took place yesterday. I can confirm that there has been no slippage, incidentally, to 05's planned in-service date and, indeed, that has not changed since the original 1982 decision.

2013. We shall be coming to that later.

(Mr Hawtin) Negotiations are underway on the order for the fourth submarine; and construction continues in the meantime under long lead funding. There has been steady progress in other areas of the programme. A number of the Trident-related works projects continue to be subject to delay, but there have been a number of key facilities which have been handed over in the past year which represents a significant achievement. This is the sixth successive year in which there has been a real reduction in the cost of the Trident programme—this year it is £17m—and expenditure to date now exceeds 50 per cent. of the total Trident project estimate. 1991/92 is the year of peak spend, and we have reached 65 per cent. in terms of commitment. The saving on the original 1982 estimate is now 15 per cent., or some 3bn[1]. Against that, I think, very favourable backdrop we have reviewed the contingency allowances and made the reductions set out in answer to question 7.

2014. The whole thing, as far as the cost control is concerned, I must say is adequate. What did this careful re-assessment of risk show were still the main areas of risk?

(Mr Hawtin) I think the main area of risk, Chairman, is certainly the works programme, which we will be coming to. We express our contingencies as a percentage of unspent balance; if it would be helpful, I can give the Committee the figures; but the works area is one. Apart from that, the tactical weapons system is an area which continues to have some problems but, overall, we are satisfied that the various elements are on track and that we have appropriate rates of contingency, which we will of course review next year. We still have a sizeable central unallocated contingency.

2015. We will come to those areas in turn. It will not surprise you to know that we plan to ask one or two questions about problem areas. Paragraph 12 of the Secretary of State's Report, Mr Hawtin, refers to a fall from 3 per cent to less than 2.5 per cent in

[1]*Note by Witness:* The total real cost reduction of £2,899m since 1982 includes savings attributable to the decision to undertake missile processing at Kings Bay and equates to 22 per cent of the original estimate. The 15 per cent reduction excludes the Kings Bay savings.

[Chairman *Contd*]
the proportion of the defence budget taken by Trident "over its 20 year procurement period". How far does this take account of falls in defence expenditure over the 90s? Will the Trident proportion not actually rise as defence overall expenditure falls?

(Mr Hawtin) No, it looks at the forecast and assumes a defence expenditure over the 20-year period up to the end of the decade. The main reason we have the decline this year, Chairman, is that the lower than originally envisaged Trident costs, like other equipment costs, have grown actually at a slower rate than the rest of the defence programme (the 3bn saving figure I have mentioned to you), and therefore the cost of the programme in relation to the overall amount of the defence budget has actually been declining for a number of years.

2016. Even taking into account that reductions were expected?

(Mr Hawtin) Indeed. Perhaps, we have done ourselves a disservice, but for the last two or three years the figure has actually been between 2.5 per cent and 3 per cent, and we have rounded up. This year it has fallen below 2.5 per cent and we thought it appropriate to quote the 2.5 per cent figure.

2017. Again, that is very commendable. Turning to jobs, over the past decade the number of jobs that you expected the Trident programme to sustain has fallen from 25,000 direct and 20,000 indirect in peak years—which you gave us in a previous inquiry—to 14,500 and 11,500. There is also a fall in the jobs directly and indirectly created over the whole period. Why has that happened?

(Mr Hawtin) I cannot give you an explanation going back over the whole period, Chairman, but obviously the elements of the programme have changed. Elements can be done more cost effectively and less manpower, in some cases, is required. What I can actually point out is that there has been an increase in the estimated number of jobs over the total procurement period since last year—it has not fallen since last year—and the figures for the peak year do in fact remain of the same order as they were last year.

2018. What net effect on jobs do you expect there to be when the programme is completed and Polaris has been withdrawn from service?

(Mr Hawtin) You are talking there about both jobs in house and in the construction of the submarines, which would obviously decline. As far as the MoD direct employed staff are concerned, the main impact I think will be the fact that servicing of the missiles will be done at Kings Bay and not at Coulport. There will therefore be an impact on the number of jobs at Coulport, which we expect during the course of the decade to reduce by about a half. Most of that we would hope to achieve by natural wastage, although we cannot rule out some redundancies. The largest element of the fall is right at the end of the period. We are talking about a very gradual decline.

2019. The House was told in December 1987 just what you said, and that you were considering establishing alternative employment there to replace the jobs lost when Polaris was withdrawn. What was the outcome of your consideration of the possibility of creating extra jobs for people?

(Mr Hawtin) It has been decided, Chairman, that Coulport is to become the single site for the processing of the Mark 24 Tigerfish torpedoes. That will take place in 1993/94. We are still looking at other options and we will continue to do so. But it would be wrong of me to pretend against the backdrop of Options for Change that it would be easy to find compensating activities.

2020. How many jobs would be involved in the moving of the Tigerfish facility?

(Mr Hawtin) I do not have the precise numbers, but they are reflected in the overall figures I have mentioned at the beginning.

2021. They are included in the halving?

(Mr Hawtin) Yes.

2022. Are there any other specific possibilities that you have looked at?

(Mr Hawtin) There are no other specific possibilities I can give you as of today. I can say that we are continuing to look for other activities, but against the backdrop of Options for Change and the reduction in defence activity I cannot pretend it will be easy to find other activities to go to Coulport.

Mr George

2023. When the Trident programme was being sold to the public—why Trident and not any other system or no system to replace Polaris—a number of optimistic claims were made: one has been the number of people who would be employed directly and indirectly, which has turned out to be absurdly wrong; secondly, another element of the campaign to sell Trident was offset arrangements. We were led to believe that the number of contracts which British companies could compete for in the United States would be high, that the offset arrangements were very comfortable as far as the UK was concerned, and that in itself has turned out to be rather optimistic. Could you please tell us how successful, or otherwise, the offset arrangements have been in terms of the number of contracts and the value of the contracts which British companies have been able to participate in in the Trident bidding?

(Mr Hawtin) Certainly. Under the exchange of letters between the then Secretaries of State, UK firms were allowed to compete on an equal basis with their US equivalents for subcontract work on US/UK weapon systems. Since then, we have had some 70 UK companies win 557 subcontracts worth $180m. That is an increase, since we gave evidence last year, of 51 contracts and $27m. There are further opportunities for orders during the production phase of the programme, although again I think it would be unrealistic for me to pretend to the Committee that, with the reductions in the size of the US defence programme, the opportunities are going to be thick on the ground. It will be very hard won business.

[Mr George *Contd*]

2024. But the opportunities appear to have largely gone then for new contracts. Whilst it seems impressive, the 70 companies and 557 subcontracts and $180m, how does that shape up with what was expected or hoped for in terms of the value? $180m looks very much like small change, bearing in mind the size of the American and British Trident programme?

(Mr Hawtin) It is certainly small in absolute terms, but I am sure it is very important to the companies who have won the contracts. I am afraid I do not have at my fingertips what original assumptions were made and, therefore, I cannot answer that part of your question directly today. I think you have also got to see it against the context of the research and development levy which formed part of the offset agreement that we had with the Americans, on which we have a very good deal, and continue to have a very good deal.

2025. In terms of not just the value or the size of what we have been able to bid for, can you give us some indications of the quality of the work? Have we tended to get high quality contracts, or more the metal-bashing side of what the Americans have been prepared to confer upon us?

(Mr Hawtin) I do not have that information to hand. I do not know whether Admiral Pirnie can help me. If not, we can certainly see if we can get you an answer.

(Rear Admiral Pirnie) I would just add perhaps that there was one substantive contract in terms of providing sub-assemblies for guidance systems, applicable to both the US and UK programme of course. There are a number of other contracts related to mechanical handling equipment, but I think we could give you a more comprehensive reply in a note.

Mr Churchill

2026. To put this whole question of offset in its proper context, can you give us a percentage figure of what percentage of the overall procurement costs of Trident and the missile system is being spent in the United Kingdom?

(Mr Hawtin) May I give you a figure when the back row have found it for me.

Chairman

2027. If they cannot the second one will, or the third or the fourth !

(Mr Hawtin) They have done so already! It is 72 per cent.

2028. The original deal on technology transfer also related to the Rapier protection of US Air Force bases in the United Kingdom. Have the recent US withdrawals affected that? What sort of costs are now involved?

(Mr Hawtin) No, they have not directly, Chairman. There have been no changes to that particular element of the Offset agreement. There is a continuing requirement for the UK to man three US Air Force Rapier Squadrons in the United Kingdom and we expect that to continue until 2001.

2029. What sort of costs are now involved?

(Mr Hawtin) We do not hold the exact costs centrally, but I think the figures for which we were liable in 1991 were about 4.5m—that is mainly the manpower and associated costs—and this year I believe they are something of the order of 6.5m.

2030. Pounds or dollars?

(Mr Hawtin) Pounds.

2031. Turning then to operations. We are getting nearer the period of a mixed Polaris/Trident fleet, and the gradual retirement of Polaris. We were very helpfully briefed at Faslane on this in outline, and we were told there were no major problems in this respect. Can we pursue, as far as we can in public in the first instance, a few details. Can you tell us when RENOWN entered refit?

(Rear Admiral Pirnie) I am sorry I am afraid I do not have that here. It was towards the end of 1987, as I recall it, but I will give you a note.

2032. Was it October 1987?

(Rear Admiral Pirnie) I believe that is so.

2033. How long was that refit programmed to last?

(Rear Admiral Pirnie) The initial estimate, I believe, was of the order of two years.

2034. Is she out?

(Rear Admiral Pirnie) No, she is still in refit.

2035. When is she coming out?

(Rear Admiral Pirnie) We plan that she should complete her refit at the end of this year.

2036. So that is quite substantially over time?

(Rear Admiral Pirnie) That is true.

2037. The House has been told that REVENGE is to be paid off and not refitted. There are other outside sources who say she has done her last patrol. Can you comment on that?

(Rear Admiral Pirnie) I cannot comment on whether she has done her last patrol. The decision, as you say, has been taken that she should not be refitted.

2038. You published the fact that her current commission began in January 1983, over nine years ago. Is it vital that she remains available until RENOWN is out of refit?

(Rear Admiral Pirnie) Whilst January 1983 is the correct date when she completed refit, in fact she became operational in August 1983 after completion of trials, working up crews and so on.

2039. Nearly nine years ago?

(Rear Admiral Pirnie) It is not absolutely vital that she continues until RENOWN comes out of

[Chairman *Contd*]
refit, although as our aim is always to maintain three SSBNs in the operational cycle if we possibly can then we would.

2040. You would not be happy therefore to rely on REPULSE and RESOLUTION alone for some months?

(Rear Admiral Pirnie) We believe that we could maintain continuous patrolling for a few months, but clearly that is a time at risk in a programmatic sense.

2041. Will either REPULSE or RESOLUTION have to be kept in commission for as long as REVENGE has been on this commission, around nine years?

(Rear Admiral Pirnie) I am afraid I cannot answer that in open session because I would then be giving planning dates well ahead. It would be our intention in a broad sense to maintain the three boat availability over the period of the Polaris/Trident overlap wherever possible.

Chairman: If we feel we need to then we will ask you this at the end in private.

Mr Home Robertson

2042. Can you tell me how many boats you have got available to patrol at present?

(Rear Admiral Pirnie) Do you mean right at the moment?

2043. Yes.

(Rear Admiral Pirnie) We have three, RESOLUTION, REPULSE and REVENGE.

Chairman

2044. What professional lessons do you draw from the problems you have had for the Trident operations? Is the lesson that three boats are enough, or do you need four or would you like five?

(Mr Hawtin) May I just invite Admiral Pirnie to give you the Naval operator's view on that, but if I could just say, Chairman, the professional advice on this issue has been, and indeed remains, that four boats are necessary to maintain the capability to deploy one boat on patrol at all times. On the basis of that professional advice, successive governments have always judged that four boats are essential to provide an assurance that one boat is always on patrol. Certainly our experience with Polaris over 20 years demonstrates clearly that continuous patrol could not have been maintained with less than four boats.

Mr Home Robertson: But is it now?

Chairman

2045. There are four boats in the cycle—one is in refit and three are operational, right?

(Rear Admiral Pirnie) I have been involved in strategic weapon systems since 1965 and I have been in my current appointment, running the Trident project, for four years now and I can assure the Committee that within the Navy and the Ministry of Defence I personally have a reputation as a consistently strong advocate of the need for a four boat deterrent force.

2046. That does not surprise us !

(Rear Admiral Pirnie) That has always been my advice to ministers and it always will be. The programme for the deterrent submarine force involves not just submarines taking over from one another on patrol at sea, as you realise, whilst just a third is in refit, but also the periods after refit, such as I was describing for REVENGE, when we work up both crews, conduct trials, including missile firings and then the final missile and warhead outloads. At the end of a commission we have to conduct pre-refit trials and of course off-load the warheads and missiles. Even with a four boat force, and that will be Polaris or Trident, there will be periods when only two submarines are operationally available (that is with warheaded missiles embarked) to maintain continuous patrolling. We view those periods as periods at risk, risk of breaking continuous patrols, because if either submarine were to suffer a serious defect or an accident then we could not maintain continuous patrolling. We therefore aim to keep those periods of what we refer to as "two boat availability" as short as possible. But they can become longer than we plan if, for instance, a major defect occurs to one submarine during a period of three boat availability, or if completion of refits are not met on time. One short period of two boat availability may be, as we have mentioned before, when VANGUARD goes into refit slightly before SSBN 08 becomes available operationally. It was, I might observe, solely in that context of that short period that I gave my evidence a year ago to you, emphasising the point in our subsequent note which appears at answer 39, page 28 of your report. I think it is worth adding that, as Mr Hawtin said, the risk of breaking continuous patrolling is likely to increase with the age of submarines. The Secretary of State I heard yesterday say that it would not have been possible over the last few years to have maintained continuous patrolling with only a three boat force. If I may add just one final point, the total Trident cost, as you will have seen in the report, is just under £10,000m on a hybrid basis, but the operational output for that investment is to provide deterrent submarines on patrol. The £400m we quote is the saving potentially available by cancelling SSBN 08, thus representing 4 per cent of the total cost. For that 4 per cent we increase our potential submarine availability by about 50 per cent and thereby gain an assurance of maintaining continuous patrols.

2047. Thank you, that is a very full and helpful answer. May I just ask one supplementary question. Given that different system, with the missiles and warheads for the Vanguard class and Trident over Polaris, does that mean that your planned periods of two boat availability will be longer than with Polaris?

(Rear Admiral Pirnie) I am sorry, I did not quite understand the question. Are you saying during the overlap period when we are running late?

[Chairman *Contd*]

2048. I am saying, when you have got your Trident fleet completely running, because you have to put in the Kings Bay element and there is therefore a longer period required to unload and all the rest, does that mean that the period of two-boat availability will be greater than it was with Polaris, and therefore your period at risk?

(Rear Admiral Pirnie) Taken as a consideration on its own, yes, that would be the case. However, we do hope to achieve initial commission lengths somewhat longer than we did with Polaris and, therefore, that is a compensating factor in the other direction.

2049. Is it significant?

(Rear Admiral Pirnie) I think in the broad we would expect to get the same periods of three boat availability out of Trident as we do with Polaris.

Mr Churchill: From what you say, Admiral, the Opposition Spokesman on Defence in the House on Tuesday misinterpreted what you said.

Chairman: We cannot ask Admiral Pirnie to interpret what an Opposition Spokesman said.

Mr Churchill

2050. It was put to the Secretary of State that, in effect, what you had said to the Committee in 1991 was that three boats were enough. What you have told us today is quite clearly that three boats are not enough. Could you clarify further the reference that you made in 1991?

(Rear Admiral Pirnie) I think the question was asked and the answer was given in the context of a period of time over which VANGUARD would go into her first refit and 08 would come into operational service. It was in that context that I made the comment and indeed, in the subsequent answer that we gave in a further memorandum, we said that because of current planning assumptions we envisage a short period between the commencement of the VANGUARD'S first refit and the entry into operational service of SSBN 08. Because continuous patrolling can be maintained with two boats there is not expected to be any threat to continuous deployment of the United Kingdom's strategic nuclear deterrent "during that period".

Mr Churchill: Thank you for clarifying that your words were taken out of context.

Mr McFall

2051. Admiral, you will be glad to know that I will not get involved in petty politics. On the issue of the Polaris boats you mentioned about RENOWN's refit at the end of 1987 that it will not be out until 1992 which is five years, which is three years beyond the normal schedule. What went wrong with RENOWN?

(Rear Admiral Pirnie) Essentially we ran into a number of technical problems that occasioned delay, and there was a requirement also that came about as a result of some defects that we had discovered broadly in the class that required some further repair work to be done. Those delays occurred, as it were, sequentially so that we were facing a delay for one reason and having then cleared that we were faced with a further delay thereafter. I think if you wanted any further details we would have to provide that in a note.

2052. Yes, but they are obviously serious defects if it was three years beyond its normal refit time, more than double the time?

(Rear Admiral Pirnie) I do not think it necessarily means a serious defect, but what it does mean is that it is a defect that takes a long time to put right.

2053. Were those defects found in other boats like REVENGE?

(Mr Hawtin) Chairman, I think here we are getting into areas we have talked to the Committee about before in private.

Chairman: We have most of this.

Mr McFall: The reason I am asking, Chairman, is that this notion of operational cycle of three boats is really not as clear-cut as perhaps the view that has been given by the Committee at the moment. How can you have an operational cycle of three boats when you have a boat which has been out of operation for five years? There are serious problems with Polaris, as has been acknowledged, so this idea of a four boat cycle is really rendered nonsense in the light of what has happened to RENOWN and the cracks with REVENGE etc. etc. That is the point I am driving at, Chairman.

Chairman: Are you trying to tell us that four boats is not enough?

Mr McFall

2054. No, not at all. Chairman, I am talking about the operation of these boats.

(Mr Hawtin) Chairman, if I could come in first. We have obviously taken the opportunity of the fact that HMS RENOWN is in refit to take into account the implications of the technical problem you are aware of, and of the necessary steps to put that right in the case of RENOWN. We have been able throughout that period, and we continue to be able, to maintain uninterrupted deterrent patrols and this does (and again I think Admiral Pirnie has answered the question), I would submit, demonstrate very clearly the need for four boats if you are going to always have one boat on patrol.

2055. The answer is still not satisfactory in the light of the situation with RENOWN and the possible cracks with REVENGE. I can see I am coming up against the Official Secrets Act and I am not going to get any further. It still leaves the point wide open. May I lastly just ask Admiral Pirnie, or the MoD, about their response to a report of last year when he said, "because continuous patrolling can be maintained with a two boat SSBN force". The MoD had the opportunity and the leisure to write the submission to us. What has really been said now is that a little bit has been missing from it and they should have added it. Why did that take place?

(Rear Admiral Pirnie) The bit that you say is missing I would suggest is there, because it says, "during this period".

[Mr McFall *Contd*]

2056. Can I ask how long "this period" is? Could you define "this period"?

(Rear Admiral Pirnie) I cannot give you a precise date, but let me say that I am talking of months and not years.

Mr George

2057. Did your colleagues in the MoD misconstrue your remarks last year, or just journalists and a number of Members of Parliament?

(Rear Admiral Pirnie) As I think I said in what I said to start with, my reputation in the Ministry of Defence is such that nobody would misconstrue my remarks.

Chairman: I do not think anyone on this Committee would have either, Admiral!

Mr George

2058. Probably when you were an able seaman the Navy were arguing for five, they could not manage without five and they were stuck eventually with four Polaris. Has any study been made of whether a three boat option (which personally I do not support) is possible? Has there been any study on whether one could manage if one is obliged to with a three boat flotilla?

(Mr Hawtin) I think it is quite clear from the evidence we have given to you that obviously in deciding that four boats are needed we have looked at the availability over the period.

2059. It is prudent, surely, to calculate, should some disaster befall a fourth boat, as to whether it would be feasible to operate with three? Not to have looked at whether one could manage with three boats seems to be less than prudent.

(Mr Hawtin) The position is that we are satisfied one cannot guarantee that you can maintain continuous patrols with only three boats.

2060. How long are the refits?

(Rear Admiral Pirnie) It is possible to construct a programme on paper that makes assumptions about commission lengths, about refit lengths, about the periods on work-up and all the other things I was mentioning that would show on paper that continuous patrolling could be achieved *but* that ideal programme, written out, would contain no contingency at all either in a programmatic sense or in the sense that I was saying before of an insurance against any form of material defect, refit delays or anything else.

2061. You mentioned a figure of saving of £400m should the boat be cancelled. Is that just the capital costs? What about the savings, or otherwise, should there be a reduction in crews? Has there been any detailed study of what would be entailed in that?

(Mr Hawtin) We are talking about a hypothetical question, but the figure in the order of £400m applies to the capital cost.

2062. You have not worked out the personnel costs or if you would require less personnel should there be three?

(Rear Admiral Pirnie) We obviously look at through life costs of the mainstream programme, but we have not been asked to cost the running costs of a three boat force as that is not the programme we are following.

2063. You may eventually have to be asked.

(Rear Admiral Pirnie) So I understand.

Chairman

2064. While we are on cancellation, which we were coming to later, the newspapers this morning all quote Mr Noel Davies, VSEL, as saying "savings would be no more than £250m" because, he says, of the renegotiation of prices on the first three boats. Do the contracts allow for this?

(Mr Hawtin) I think the answer, Chairman, is that we are talking about a hypothetical situation. What we have given is an estimate, which we think is a reasonable one, of the savings that would accrue. Obviously there would be negotiation.

2065. Does that include non-VSEL savings?

(Mr Hawtin) It is an all-up cost.

(Rear Admiral Pirnie) The £400m includes non-VSEL savings.

2066. And the smaller missile buy?

(Rear Admiral Pirnie) It is an all-up cost.

Mr Home Robertson

2067. To follow that up, if I may. That does seem to account for the suggestion that we have to pay more for the first three boats if the fourth one does not go ahead. Is that right? Can you confirm that?

(Mr Hawtin) I do not think I can go into any further detail. We have given you a ball park figure. There would obviously be negotiations with the company about the implications.

Chairman

2068. If the decision was taken?

(Mr Hawtin) If the decision was taken. Thank you, Chairman.

Mr Home Robertson

2069. So it might not be as big a saving as we had been led to believe earlier. I have great sympathy with Admiral Pirnie but it is inevitable his words are going to get pored over a bit here. Obviously it is part of the duty of this Committee to work out what is the best value for money and what we need. We went to France last year and we were told they managed to keep three out of their four operational boats on patrol at any one time. We are entitled to ask whether we need belt and braces, as is being suggested. The Admiral told us last year, "it is clearly ideal that we have three submarines in the operating cycle. We could maintain a continuous patrol with only two submarines". Is he changing that statement now?

[Mr Home Robertson *Contd*]

(Rear Admiral Pirnie) I am not quite sure what I can add to what I have said already.

Chairman: I think you made it perfectly plain this was with reference to the gap between VANGUARD going in and 08 coming out?

Mr McFall: We saw France with five SSBNs, four in the operational cycle, and they told us they can keep three out of the four on patrol at all times. If they can keep three out of the four on patrol at all times why can we not keep two out of three, that is the question?

Chairman

2070. The difference between two-thirds and three-quarters I would have thought.

(Rear Admiral Pirnie) I am afraid I cannot speculate on how the French operate their force nor the definitions they were using, when they spoke to you. Their "operational" may well be less rigorous than ours. I am afraid I cannot comment.

Mr McFall: Could you give us it in writing?

Chairman: Admiral Pirnie's responsibilities are for the British Fleet, not the French.

Mr McFall: That was a joke, Chairman.

Chairman

2071. For the record, will there be substantial additional costs arising from having to run in parallel for some years two different classes of boats with two different crews and so on? You told us in 1988 of 800 additional men, that is; one additional cost is that proving to be right?

(Mr Hawtin) I do not think there will be major additional costs during the period. There will obviously be difficulties arising from running two different types of boats but I do not have a precise figure I can give you today, Chairman.

2072. What about the 800 additional men you thought you would need?

(Rear Admiral Pirnie) Those reflect, naval personnel. The most obvious contributor is we effectively run two depots at Coulport in parallel over the period of the Trident/Polaris overlap and there is bound to be a bulge in the running costs at the time of the Trident/Polaris overlap.

2073. You cannot put a figure on that?

(Mr Hawtin) Not today at this moment, Chairman.

Chairman: If you would be able to give us an idea for the record, that would be helpful.

Mr Cartwright

2074. Just on the question of crews. I appreciate in the early period of overlap of the operation you will need two sets of crews, one for Polaris and one for Trident, but as Polaris phases out presumably the crews will be retrained for the Trident operation?

(Rear Admiral Pirnie) That is so. There is one full crew standing by VANGUARD now and a proportion of the second crew, and of course the remainder of those personnel, and some of the early ones for the second submarine, VICTORIOUS, are in the training population. Meanwhile, we are still having to run the Polaris force. That is the start, as it were, of the Trident/Polaris overlap. You are quite right: as we decommission the Polaris submarines those crews who have experience of running that older strategic weapons system will be retrained and will be fed back into the system joining the Trident programme.

Chairman

2075. The annual running costs for Polaris, have been £250 million a year in current prices, how will Trident compare with that?

(Mr Hawtin) We would estimate running costs in Trident will be about the same order, around about 2 per cent of the defence budget.

2076. You will be able to run Trident for the same price as Polaris?

(Mr Hawtin) Obviously we will get experience when it is in service but our estimate is it will be comparable costs.

2077. Let us now turn to VANGUARD. Yesterday was a red letter day for everybody. You have now provided an unclassified entry into service date of towards the end of 1994 or early in 1995, has there been any slippage over the past five years in this in-service date?

(Mr Hawtin) No, Chairman.

2078. Or in the date for the Contractors Sea Trials which you have said will run from October to December of this year?

(Rear Admiral Pirnie) Compared to our original planned date in 1983 for the Contractors Sea Trials there has been some slippage in that date.

2079. What sort of order?

(Rear Admiral Pirnie) Of the order of four months.

2080. Thank you. Has there been any slippage in the date for the first patrol?

(Rear Admiral Pirnie) There has been no slippage for the in-service date, ie the date of the first patrol.

2081. So the Daily Telegraph claim today that it will be at least late 1995 before the first patrol is quite wrong?

(Rear Admiral Pirnie) As far as I am concerned it is totally wrong.

(Mr Hawtin) The date remains that we have given the Committee in confidence.

2082. I understand. What are your broad dates for the Royal Navy acceptance trials, presumably early next year?

[Chairman *Contd*]

(Rear Admiral Pirnie) You are talking of acceptance trials from the contractor at the end of the first contract, yes that would be in the early part of next year[1].

2083. You have told us in one of your answers there is "limited scope" for bringing forward VANGUARD's in-service date, can you be a little more detailed about that?

(Rear Admiral Pirnie) There is very little contingency at all in the programme and it would have been a rather simpler answer to have said just that. If we were to take some fairly radical measure, such as for instance to decide to work up only one crew and then deploy her initially and then have a period when we are working up the other crew, or something fairly radical, unusual, like that, conceivably you could advance the in-service date. I think for all practical purposes you would say there is very little contingency and very little scope for advancing the in-service date.

2084. That takes care of VANGUARD. We will skip over VICTORIOUS and VIGILANT which seem to be going nicely and turn to 08. Has she got a name yet?

(Rear Admiral Pirnie) It is only given a name when the order is placed.

2085. So you have one in mind?

(Rear Admiral Pirnie) It would either be at the time the order is placed or when the keel is laid, more usually the latter, when the keel is laid.

Mr Churchill

2086. Is the long-lead work on 08 still progressing? Can you give us any feel for how much more beyond your £158 million expenditure to the end of December 1991 which you gave us in your answer 6?

(Mr Hawtin) £138 million I think, Chairman. Long-lead funding for 08 continues and it covers the major steel work modules and the engineering items, hull units, bulkheads, the main motors and pumps.

2087. How near are you to placing an order?

(Mr Hawtin) As the Secretary of State has said we will place an order when the contract negotiations have been completed satisfactorily.

Chairman

2088. That does not answer the question. How near an order are you?

(Mr Hawtin) We are negotiating, Mr Chairman. I will turn to Mr Phipps, who is our head negotiator, to fill you in.

(Mr Phipps) As Mr Hawtin said negotiations are in progress. We are negotiating across a range of issues. There are a number of key areas to be resolved but we continue to make progress. It would be foolish obviously to predict when we will finish and where we will finish.

2089. Weeks, months, years?

(Mr Hawtin) I do not really think, Chairman, we can speculate on a precise timescale.

Mr Churchill

2090. What are the sticking points?

(Mr Hawtin) Again, subject to correction from Mr Phipps, I do not really think we can get into the problem areas when we are currently negotiating hard with the company.

(Mr Phipps) We are negotiating across every element of the price. There is nothing I would single out as a big sticking point we must overcome. We are looking at the whole make up of the price.

2091. Could you not at least be as open with the Committee as apparently some senior naval officers have been with journalists on 2nd March when the Independent, the Times and the Daily Telegraph all had stories suggesting that it was above all the overheads on the Devonshire Dock Hall that was the sticking point?

(Mr Phipps) Overheads are clearly one of the largest elements of the prices, yes, but they are not the only one.

2092. Has there been a slice of the overheads of the Devonshire Dock Hall included in each of the three vessels so far and is that one element that would need to be renegotiated were the fourth boat to be cancelled?

(Mr Phipps) Yes.

(Rear Admiral Pirnie) We do not apportion the overheads to each submarine. Overheads are shown as a calculation overall.

(Mr Phipps) We negotiate a company rate each year. Yes, clearly there would be an impact on the company's overheads.

2093. To what extent have MoD been repaid for the loan on the cost of the Devonshire Dock Hall?

(Mr Phipps) That is not something which I think I could answer at the moment. I could put in a note if you want?

(Rear Admiral Pirnie) My understanding is that the Devonshire Dock Hall was part of what was purchased when the company became private; it had been a nationalised concern.

Chairman

2094. There is no repayment due from the MoD?

(Rear Admiral Pirnie) There is a writing off of overheads as there is with any capital overhead.

2095. Is that right?

(Mr Phipps) That depreciation in overheads continues over a number of years.

(Mr Hawtin) If I remember correctly this issue was specifically addressed in the contract for 07.

(Mr Phipps) The question of the depreciation for Devonshire Dock Hall, yes.

Mr Churchill

2096. Is the delay in signing a contract liable to affect the in-service date of 08?

[1] *Note by Witness:* The currently planned date for contract acceptance trials is [date classified]

[Mr Churchill *Contd*]

(Rear Admiral Pirnie) At this range there is no reason at all why it should affect the in-service date of 08. Indeed, as part of the negotiations we are considering different programme options involving the dates for 07 and 08 in order to achieve the most cost effective and industrially sustainable construction programme while achieveing our operational needs.

2097. Could you at this point conceivably have 08 ready before the first VANGUARD refit was due?

(Rear Admiral Pirnie) It is conceivable but we have yet to agree the dates with the company. It is also equally possible, as I think we have discussed at some length, that there may be a slight gap between 08 becoming operational and VANGUARD's entry into refit.

(Mr Hawtin) Perhaps I could just add that as part of the contract negotiations on 08 we are looking with the company at what makes a sensible build programme for 07 and 08 together and what makes best sense in defence programme terms.

Chairman

2098. When you say the delay has not affected the in-service date of 08, which I understand is the answer, when would it start to do so: weeks, months or years? You are being very shy about this. There must come a time when if you cannot agree contract terms there will be an inevitable delay to the in-service date of 08?

(Rear Admiral Pirnie) Indeed there is bound to be.

2099. Yes.

(Rear Admiral Pirnie) I do not think one can put a precise date on it. I think we had somewhat of this discussion over the time when we were talking of 07's contract. There is certainly nothing like a month for month delay. It is the difference between running a regime on a cost plus long-lead contract whereby the Ministry of Defence is controlling the rate of expenditure of the programme, and the regime when the build contract is placed, when the contractor is working to a fixed date and cost and he has control of the programme, he is much closer to the task and it is therefore a much more efficient and sensible way of running it. Our aim is to get to that position as soon as we can and it is the contractor's aim as well. We just have to agree costs and conditions.

Chairman: "Just!"

Mr George

2100. It does seem rather strange, having spent almost £140 million on 08 you have not even reached the stage of signing a contract as to whether one will ultimately receive an order on 08. Does it not reflect less than credibly on the process of negotiation?

(Rear Admiral Pirnie) I would not have said so. If you look at the periods between invitation to tender and order for the previous submarines and particularly bearing in mind this is a single source supplier, in fact both the Ministry and the supplier are in monopoly positions, as it were, the time from invitation to order for the SSBN05 was 18 months, that for 06 was 14 months[1], that for 07 (for a variety of reasons you will recall including a strike at VSEL was 32 months. We issued the invitation to tender for 08 in July last year.

2101. The programme has not crept up on us, it is 12 years since the decision to build or procure. Should not one have reached this position earlier rather than exacerbating what is for a variety of political reasons creating a great deal of uncertainty as far as the workforce is concerned?

(Mr Hawtin) I do not think so in that precise sense, Mr George. We are talking about a major programme, we are not ordering these submarines in batches, we are ordering them individually and the negotiations start in relation to the date and then the requirement for the boat. Obviously the further one gets into it the more difficulties there are in the sense that both parties have their particular interests from the monopoly/monopsony relationship and the harder negotiations become.

2102. Roughly what percentage of the final costs on your estimate of £140 million being spent would that represent, obviously the figure is subject to some variation but at least roughly?

(Mr Hawtin) I will certainly look at whether we could give you a note on that. We are in some difficulty giving you a percentage figure because it does not take a mathematical genius——

2103. That is what I asked, roughly, surely it is not going to vary beyond a certain level, beyond certain parameters. I would appreciate some rough figure as to the percentage you would expect would be spent on final costs?

(Rear Admiral Pirnie) We could certainly give you not only that but also the percentage we spent on the long-lead on the other submarines as well.

(Mr Hawtin) They are 4 per cent for 05, 8 per cent for 06 and 34 per cent for 07.

Chairman

2104. Is there a bar on you placing the contract during a General Election period?

(Mr Hawtin) I think the Secretary of State said yesterday that after an election has been called it would not be proper to place a contract.

Mr Cartwright

2105. Could we just clarify that previous answer, the figures you gave us on the percentages of long-lead items, was that expenditure before the contract was placed?

[1] *Note by witness:* 14 months is the interval between the receipt of the tender for SSBN 06 and contract placement; the interval between the issue of the invitation to tender and the placement of the contract was 20 months.

[Mr Cartwright *Contd*]

(Mr Hawtin) That was a percentage of long-lead funding as a percentage of the build contract and the final price.

2106. What I am trying to get at in relation to 07 for example, you said 34 per cent was the long-lead items, was that 34 per cent dated before the order was actually placed?

(Mr Phipps) Yes, that was the percentage committed at the point of placing the contract. Clearly it was greater at the point of 07 because of the long negotiating period.

Mr McFall: To follow up this question: what chance is there of the contract being signed, say, in the next week before the General Election?

Chairman

2107. That is making an assumption I do not think it is fair to put to officials.

(Mr Phipps) All I would say is that the date of a General Election, even if I knew it, is not something which figures in my negotiating plan.

Mr McFall

2108. It could be weeks the contract could be signed in?

(Mr Phipps) It really would be foolish for me to say. If the company walked in tomorrow and made an offer I could not refuse and I had reached a point where I could recommend it to Ministers, recommend it I would but it would be for Ministers to decide. At the moment we are patiently negotiating our way across a whole range of issues.

Mr McFall: I should not be surprised if I read in my Daily Telegraph next week that the contract has been signed?

Mr George: I should be amazed if you read the Daily Telegraph!

Chairman

2109. We will try and not let that remark go straight to Scotland, it may not do your cause any good. Can we turn to the tactical weapons system. From your written answer the timetable is evidently tight. What are the latest forecasts on sonar, the command systems and integration?

(Mr Hawtin) I will invite Admiral Pirnie to answer on that.

(Rear Admiral Pirnie) Over the past year we have made substantial and satisfactory progress with the tactical weapons system. Dealing first with the main sonar, you remember Sonar 2054, you will recall three years ago in evidence to this Committee we predicted the harbour trial for VANGUARD would complete in August 1991. I have to admit we did not meet that date but the trial was concluded successfully early in December of last year and the sonar was declared fit to support Contractors Sea Trials. This was a major achievement although as I have said before it will only be when we get the submarine to sea that we will be able fully to test the outboard equipment, especially the intercept sonar, and the towed array, including the handling gear. Although the major development problems that you mentioned before have been solved a number of minor queries have been tested at both the contractor's premises and the shore development facility. The design reviews of all the developments of the sonar equipments except for one monitoring set, have been concluded and we have recently completed the contract acceptance schedule trials using the equipment destined for VICTORIOUS. The design certificates for the 2054 will be signed off shortly. Development then is treated as complete. In anticipation of a question you will probably ask me about the production and development overlap, the overall slippage will probably be nearer to four years in toto for completion of development than the three we gave in our written answer to your question 13. Nevertheless, that does not present any programme risk to Trident and we still expect the contract to come in near the target price.

2110. Thank you very much.

(Rear Admiral Pirnie) Do you wish me to turn to the command system?

2111. Yes. I asked you three questions.

(Rear Admiral Pirnie) Turning to the submarine command system, progress has been somewhat slower than we had planned. We do have in the shore development facility a provisional version of the software needed to support Contractor's Sea Trials. Yesterday I saw it in operation. We have also had to restructure the issues of software needed to support the programme after Contractor Sea Trials and to redefine the functionality of some of those issues on software. We now plan only two more main issues, which unimaginatively will be entitled "Issues 3 and 4", prior to fleet weapon acceptance, although Issue 3 will have two interim issues and Issue 4 will have one. I explained in evidence last year that it was not until August 1986 that we embarked upon the new command system and it may be worth putting on record that in the staff requirement it was recognised that it might not be possible to achieve the full capability by the time of initial deployment of VANGUARD but that it should be achieved by VICTORIOUS' deployment. Our programme will still give the first of class the full capability, but it is undeniably a very tight programme. The remainder of the system, and by that I mean the Spearfish Torpedo, its handling and discharge system, countermeasures, the electronic support system including periscopes, the radar and the navigation equipment, are all meeting the submarine and shore development facility programmes. As for the shore development facility, that has certainly proved its worth in bowling out problems but the time taken in solving those problems combined with the slippage in both the Sonar 2054 and SMCS programmes has meant that the shore development facility is now barely a month ahead of VANGUARD, but it is still able to conduct trials before VANGUARD does.

2112. If in the next six months or so it is discovered that more software, or hardware for that matter, changes are needed will the Contractor's

[Chairman *Contd*]
Sea Trials have to be delayed or full installation of the tactical weapons system in VANGUARD, or do you press on and rectify it afterwards?

(Rear Admiral Pirnie) We now have the sonar cleared for Contractor's Sea Trials and the command system, as I saw in operation with the latest issue of software yesterday, incidentally, we expect to be certified as capable of supporting Sea Trials. To answer your question more specifically: if, and I think it is extremely unlikely, we should discover that command system could not support the Sea Trials it is still practicable for the submarines to operate using the manual systems they have used for many years past and we would have to take a decision in conjunction with the operators as to whether we took the submarine out on that basis. I would have to emphasise I view that as being extremely unlikely.

2113. We do not have another Type 23 CACS on our hands?

(Rear Admiral Pirnie) I do not think we have another Type 23 CACS on our hands.

2114. That is good to hear. The cost of the tactical weapons system is now about 45 per cent more than originally estimated and, therefore, 8 per cent instead of 5 per cent of the programme. Can you be confident now on keeping costs under control?

(Rear Admiral Pirnie) We are certainly with the command system, as I said, interfacing with a number of other programmes and developments and by that I mean the Sonar 2054 and Spearfish. Principally the development of the interfaces between them is something which has to be done on a progressive basis although we have made substantial progress in defining the interfaces and getting those under contract and that removes a good deal of the risk. As I said earlier, it will not be until we get the submarine into the water and on trials that we will be fully confident we have got those interfaces correct. Because of the nature of the contracts which are largely fixed, or firm price contracts if we find we need to change those interfaces then we would be needing to negotiate with the contractor on how those costs are attributed. I believe the costs are under control but I could not say there is no risk left in the programme.

2115. Have we learned any lessons from this experience, for example anything that would read across to the SSN20?

(Rear Admiral Pirnie) I suppose with the benefit of 20/20 hindsight it was unfortunate not to have recognised earlier that the command system that was originally chosen, and I am talking back in 1982 at the start of the project, was not going to prove adequate. Therefore, we introduced that major new development programme which had to interface with a number of other programmes comparatively late in the programme. In such circumstances the ideal would have been to put more effort into defining the full interface specifications early including the data flow and getting those interfaces contractually underwritten and then probably using a contractor to police and manage those interfaces. The contractual strategy for the follow on Trafalgar class has yet to be determined but I am in frequent contact with the project manager of that programme and certainly any lessons we have learned we have passed on personally.

2116. Turning now to the strategic weapons systems. Why does the total UK planned total missile buy remain classified?

(Mr Hawtin) Because, Mr Chairman, that is a detail of our forward planning that Ministers do not consider it appropriate to release at this stage.

2117. Why?

(Mr Hawtin) Because it would reveal information about the overall size of the force. It is something that at the end of the day Ministers have yet to take a final view on.

2118. The size of the force?

(Mr Hawtin) The number of missiles is something Ministers have not wished to make public. We have given you the information on a confidential basis. We have also, when contracts have been placed, given the numbers of missiles involved in those contracts.

2119. Have you told Mr Yeltsin?

(Mr Hawtin) I do not know.

2120. I would be surprised if you had not. You have told him on a confidential basis too?

(Mr Hawtin) I cannot answer that question, Chairman.

2121. It is just that as we move to a different period of attitudes towards these things, I am a little surprised that figure—there are other figures which remain confidential—at the need for that one to be secret?

(Mr Hawtin) I think the Secretary of State dealt with the overall position during Defence Questions in February when he explained there is a very important element of uncertainty in deterrence and that is something the Government wish to maintain.

2122. I do not quite see the connection between the uncertainty and the total buy. Times are changing. You clearly cannot change Ministry of Defence policy on the hoof but I think the question ought to be asked again. Can you publish the period of time over which the purchase is to take place?

(Mr Hawtin) We will be prepared to take that question away and look at it, Chairman.

2123. Good, thank you.

(Rear Admiral Pirnie) I would like to add: whatever we said in a note to you now could change, not because of changes in our requirements but because of changes in the US programme if they changed their programme.

[Chairman *Contd*]

2124. Exactly. It is the secrecy behind it which I find just a little puzzling. I can understand there are aspects of the results which are secret, do have to be kept highly secret, some which you quite rightly have not even told us. It is just that figure which strikes me as an odd one you need to be so coy about. You say that the deferral of the US retrofit programme will cost about $105 million or £66 million. What are the offsetting savings you have identified?

(Mr Hawtin) They are a £42 million reduction in contingency provision, a reduction in missile processing cost at King's Bay of £20 million and other minor savings which add up to £20 million.

2125. Have you given the US strategic systems programme your schedule of requirements?

(Mr Hawtin) Yes, this is something we discuss with them on an annual basis when deciding how many missiles to order in any particular US financial year.

2126. Are they pressing you for any changes in the numbers or pattern of ordering?

(Mr Hawtin) Not that I am aware of, Chairman.

2127. They are quite content with what we say when we say we want them?

(Rear Admiral Pirnie) They have expressed no concern at the numbers that we have been discussing with them. Their next contract is not placed until October.

2128. October?

(Rear Admiral Pirnie) Yes.

2129. I am interesting in asking the question because one could imagine their requirements changing quite significantly. That could have a knock-on effect but you have had no signs of that possibly because our order is so relatively small?

(Rear Admiral Pirnie) I think over the years when we are procuring our missiles they are a significant percentage of the total order. It is not the case that they are, as you said, relatively small, they do have an effect on the unit production costs.

2130. Because of the timing of their orders *vis à vis* our's?

(Rear Admiral Pirnie) Yes.

Mr George

2131. One of the reasons why the Government moved from Trident I to Trident II was because the Americans were progressively getting out of Trident I. Now they will be having a mixed force of Trident I and Trident II shutting down production lines. Do you think on reflection one entered into the expenditure on Trident II and largish submarines on the basis of something which never eventually happened and that was the progressive abandonment by the United States of Trident I missiles?

(Rear Admiral Pirnie) I think there are two points to make. The first is you are assuming that the Trident I submarines will never be back fitted with Trident II. What I believe is the case in the United States is that the programme is outside the budgetary period which is shorter than the LTC period we adopt. It still appears in the American Navy's programme they will be back fitting their Trident I submarines to Trident II, therefore they could have a total Trident II force. The second point is even if they did stay with Trident I then it is most likely they will be deploying their Trident I submarines from the Pacific base and their Trident II submarines from the Atlantic base and of course it is the Atlantic base from which we hope we will be sharing our own processing facilities and therefore that commonality would be based on Trident II. So I think even with the benefit of hindsight the decision to go to Trident II is sustainably correct.

2132. I defer to your knowledge of the British Trident programme but I suspect that you should see what is going on in Congress in funding over Trident I and Trident II and I will reserve my opinions as to whether I defer to your analysis of the American programme. If there is such a move towards Trident I in the United States as there has got to be because of circumstances and as there will be quite a number of Trident I missiles sloshing around in the American system, as there will be, I am not technologically qualified but is there anything that might be of advantage to our programme of purchasing surplus Trident I missiles? How difficult will it be to fit Trident I missiles into our submarines? I could certainly see arms control advantages in moving to Trident I but I do not know what the technological advantages or disadvantages might be.

(Rear Admiral Pirnie) As I understand what you are referring to, as they pay off their Poseidon submarines converted to Trident I there will therefore be Trident I missiles becoming available and therefore they will be available for disposal or possible procurement?

2133. Could they be used?

(Rear Admiral Pirnie) The difference between Trident I and Trident II in an engineering sense is really very extensive and it would not be practical for us to modify our submarines to take Trident I without an inordinate expense and certainly we could not run a mixed outload or anything like that. I would not have seen it as being even a possible route we could follow.

Chairman

2134. Turning to warhead safety and transport, you told us that Ministers do not yet have Professor Oxburgh's Report on nuclear weapon safety. When do you now expect it?

(Mr Hawtin) I can bring the Committee up to date on that, Chairman. The report has now been submitted to Ministers. They have also asked for, and received, advice from the Ministry's indepen-

[Chairman *Contd*]
dent advisors, the Nuclear Weapons Safety Committee, and Ministers are currently considering the report. What I can perhaps add, if you would find it helpful, is that the report is generally reassuring and the initial view taken on it is that it provides welcome corroboration of our confidence in the safety of our weapons and operating procedures. It is, of course, a special review carried out by Professor Oxburgh against the background of Drell. I should emphasise the safety of nuclear weapons is kept under continuous review and independent scrutiny throughout the life of each weapon. There are rigorous safety checks made on it. We are talking about an addition to the current and normal and very extensive safety procedures.

2135. Do you know of the outcome of any US determination of procedures as a result of Drell?
(Mr Beaven) I am sure you are aware the Drell Committee made a number of recommendations. The majority of those were about the administration and management of the US Nuclear Weapons Safety Assessment process. Some were about the introduction of new technologies and some were about the carrying out of further studies and reviews of the US stockpile. The majority of the recommendations regarding administration have, as far as I am aware, been introduced and certainly the studies which Dr Drell recommended have all been put in place. We are not aware currently of the results of any of those studies but when they are available we will be considering those with interest and obviously looking at any implications for our own stockpile.

Mr McFall

2136. You are aware, Mr Hawtin, that the United States spent 15 million dollars on looking at the safety implications of Drell—that is the financial year 1992—and the concern has focused on the D5 W88 missile warhead combination but there is the D5 W76 combination being used in the United States at the moment and according to public records that lacks the safety features of the W88. Do we have any information on W76 because I am mindful last year we bought Mark IV re-entry vehicles which are used alongside W76? I am concerned about the safety features if we are getting a design along the lines of the W76 which has safety faults and the focus of attention has not been put on that because it has all been on the W88 since Drell?
(Mr Beaven) Firstly, we are aware of some of the design features of the W76 to which you refer, but as you are aware the warhead for the Trident fleet in the UK is a UK designed weapon, it is not necessarily a direct copy or based solely on W76. Therefore, I do not think you can, even knowing the features of W76, necessarily read across that those apply directly to the UK weapon because that is a UK design.

2137. I know I cannot necessarily do so but I was asking a question to try and get more understanding of what you have done in the safety features?
(Mr Beaven) As you say, the Drell Report did not draw any specific attention to W76, it did concentrate on W88 as such and we are aware of the implications and features which they were expressing concerns about. We have taken that into consideration in our own assessment of our own design of the warhead. The independent review by Professor Oxburgh's group has given generally a reassuring statement with regard to the Trident warhead.

2138. You are reinforcing my question but I am getting no further. I do not think I will get any further. On the number of warheads we have, and given we are purchasing the Mark IV bus, can the number of warheads be varied by ballasting the bus?
(Rear Admiral Pirnie) Yes.

Chairman

2139. We have been told you are going to provide 20 special armoured vehicles and 250 special containers to Russia to help them move their warheads and the replacement Trucks Cargo Heavy Duty due to be available in the second half of this year. Can you assure us that it is not these long awaited replacements for the Mammoth we are giving to the Russians?
(Mr Beaven) Perhaps I could start by saying TCHD Mark 2, to which you referred, the first examples of that have been delivered and are undergoing proofing trials in the UK. We are confident they will be available later in the year to provide the support needed. Discussions with the Russians have been going on, as you referred to we are discussing with them their exact requirements, but there is currently no decision on which vehicle we have available will best suit their needs.

2140. Do we have a choice if we are going to send them up to 20 special armoured vehicles and 250 special containers? Is there a wide range we can offer them or are we going to hand them the Mammoth?
(Mr Beaven) There are more vehicles than Mammoth in considering and looking at the options.

2141. What do they do at the moment?
(Mr Beaven) They either transport components for weapons or whole weapons.

2142. They are presumably in-service and being used?
(Mr Beaven) They will be in-service.

2143. How can we spare them?
(Mr Beaven) The assumption is there will have to be some further procurement to support the Russian buy. Whether in the meantime we can release some of our vehicles while that additional procurement is going on is something we will be looking at.

2144. There will be further procurement to support the Russian buy?

[Chairman *Contd]*

(Mr Beaven) That is as I understand the situation.

2145. Out of defence funds?

(Mr Beaven) I am not sure if that has been decided.

2146. I trust you are complaining loud and long that it should not come out of the defence funds?

(Mr Beaven) I am sure that will be our position.

2147. You are? Robustly? I am not arguing with the aid, if we need to give aid to the Soviet Union that is a sensible, some would say political, decision, but it is not part of the defence of the United Kingdom.

(Mr Beaven) Not all the money will come out of the defence budget.

2148. You are fighting to ensure none of it does?

(Mr Beaven) That is something for discussion.

2149. Is that the Ministry of Defence's position?

(Mr Hawtin) I think, Chairman, we are more than alive to the interests of the defence budget. I think the difficulty is neither Mr Beaven nor I nor any of the team are negotiating the financial arrangements, but I take the point of your question.

2150. Pass it on to the Treasury with my compliments. Let us turn now to works, Trident related and Trident attributable. We had a long but very informative day last week at Hunterston, Faslane and Coulport looking at what I believe they say is Europe's biggest construction project. I did at the time think of asking how it compared to the Channel Tunnel. Can we sort out the question of costs first. Our figures, which come from yours, suggest that the proportion of Trident expenditure devoted to works has risen to almost 12 per cent and some of those increases have been over the past five or six years. Can you give us the principal factors in the £145 million real increase for the past year as you did in 1990 over a similar increase?

(Mr Heyhoe) The £145 million, Mr Chairman, which you have mentioned is the real cost increase over last year's works costs for Coulport and Faslane on a hybrid basis. About 40 per cent of that is down to PSA resource costs, that is £57 million in fact. The remaining, about £100 million, is broken down between about £15 million, say, at Faslane and the balance at Coulport, so the preponderance is at Coulport.

2151. That first figure is very surprising, £57 million PSA cost. Why?

(Mr Heyhoe) I think the reason for that, Chairman, is that we are at a stage of the programme where the requirements of the nuclear safety case, as we move from straight construction into the commissioning phase are biting much harder.

2152. But you had expected that, had you not?

(Mr Heyhoe) We had expected it. We certainly should have expected it but it was very difficult to quantify it accurately. I think that is one of the reasons why it has gone up to such an extent. The other reason is that the final stages of the project require production of a good deal of documentation in terms of the operating manuals and that sort of thing.

2153. 60 million quid's worth of paper does sound a lot.

(Mr Heyhoe) Absolutely right. There is an awful lot there.

2154. I shall keep my face straight while you give us those figures.

(Mr Heyhoe) There is an awful lot of it.

2155. Not tens of millions of pounds of documentation?

(Mr Heyhoe) The fundamental point underlying all this is that PSA resource costs break down into 85 per cent consultants' fees and only 15 per cent PSA costs themselves.

Chairman

2156. I do not want to labour this but are these unexpected real rises a sign perhaps of careless planning earlier on?

(Mr Heyhoe) I would not say careless planning but clearly by definition it was faulty because they were not foreseen, I think in fairness that it is very difficult to foresee in a project as complex as this one.

Mr McFall

2157. When we visited Faslane we saw some of the projects and it was mentioned to us about different design changes that have taken place. Is it not the case that there has been a fast track planning process over which the consequent design changes have been made simply because the project was not planned as thoroughly in the first place as it should have been?

(Mr Heyhoe) I am not quite sure whether 'fast track' is a term of art and whether, strictly speaking, this is fast track, but I understand your point. It is the case that with these projects, principally because of the time factor relating to the programme of the submarines, we proceeded with construction before designs were completed. That is certainly the case.

2158. There have been consequences of that. I will mention at a local level I have been contacted by a number of contractors and sub-contractors who have gone out of business, some of whom have been owed £850,000, another £3 or £400,000 and the relationship between sub-contractor and main contractor means the MoD can wash their hands of any responsibility to these sub-contractors and small firms and individuals who have lost their jobs because of negligence, in my opinion, by the MoD and the PSA.

[Mr McFall *Contd*]

(Mr Heyhoe) We do not wash our hands of this, if I could put it that way, Mr Chairman. I am aware of the general point and indeed particular point Mr McFall raises, because they have been raised previously in the House and by letter to us. Where we are made aware of difficult situations, as the MoD, we certainly bring those to the attention of the PSA. Where the PSA likewise are made aware of the problems, they bring them to the attention of the main contractor. Certainly so far as the MoD is concerned, I do not see how we can get involved in the contractual relationship which exists between the sub-contractor and the contractor himself.

Mr McFall: You could if they were a nominated sub-contractor, that is the first thing, you changed the rules a number of years ago. My final point is the fact I am dealing with contractors and people who have lost their jobs and I am appealing to the MoD and PSA, absolutely nothing is happening and you come and tell us the PSA resource costs have increased by 60 million pounds, mostly for paper, and yet the reality is I cannot get any movement at all from the PSA and the MoD on the real issues like small firms being put out of business and people losing their jobs. It is that point I want to highlight when you tell us as a matter of fact there has been a £60 million increase in PSA resource costs and one cannot examine what that means.

Chairman

2159. That did not seem to be a question therefore I do not know it needs an answer. You separated out Rosyth works and functional machinery in 1991 to reflect the fact that DGSR was managing RD57 *et al* at Rosyth. We should have asked then what is "functional machinery" for which £31 million is shown?

(Mr Heyhoe) Basically functional machinery consists of moveable items which are not part of the construction programme or fittings themselves. Things like mobile cranes, mechanical equipment, test equipment, monitoring equipment, machine tools, that kind of thing.

2160. The Bovis Report, did it recommend much more than will be your normal practice now that you are untied from PSA?

(Mr Heyhoe) The main recommendations of the report, Chairman, were those which we indicated in an answer given in response to the Committee's equivalent report last year. You will have seen from those, I think, that the scope of it was really towards the management of the programme as a whole. I think it is fair to say it was really a snapshot and it looked at the programme at the stage when we were really moving from construction more towards the commissioning phase and also, as you imply, at the point where we had from the 1st April 1990 been untied from the PSA. It made a number of recommendations on the basis of weaknesses which it had identified in our own arrangements for handling both those states of affairs. It was a very useful report as far as we were concerned.

2161. Will your Work Services people be increasingly geared up to take on oversight of major projects, for example at Rosyth?

(Mr Heyhoe) They will be reinforced in the sense that there have been, in the light of the lessons of the Trident works programme so far, notes of guidance issued by the Head of Defence Works Services which lay down guidance for project sponsors: so reinforced in that sense certainly.

2162. How much have you drawn on US experience? How far have you and the PSA replicated US facilities at Bangor, Maine and Kings Bay?

(Mr Heyhoe) In terms of replication I think there are a lot of differences so far as the topography and environment and weather are concerned. The PSA did visit Kings Bay in the early stages. Certainly it is the case that in determining what we needed by way of our own facilities we were, to some extent, of course, obliged to meet certain environmental and protective standards and we were aware what the Americans were doing for their part.

2163. Are our shore construction facilities vastly different from the Americans?

(Mr Heyhoe) In the sense that we have a piled shiplift, for example. I think the explosives handling jetty is also different.

2164. Was there anything to be gained or saved by looking at the American experience and saying: "That is the way for us to do it"?

(Rear Admiral Pirnie) In the sense it was a facility that was going to handle strategic weapons system equipment then the Americans defined for us the specifications of those handling facilities, that those handling facilities had to meet. Taking the question more broadly the Americans, for instance, do not have a shiplift, they do have two very large graving docks but the topography is quite different there, as you have seen because you have visited it; it is essentially built on sand. It is very much easier to build a graving dock in sand than granite. The Explosive Handling Jetty is a similar type of jetty to that at Kings Bay and a lot of the specifications, of course, for handling missiles and warheads have been derived from the United States. The principal difference is that because of the steeply shelving cliff edge at the site at Coulport our jetty has to float whereas the American's is a piled jetty in a rather more conventional manner.

2165. We were just coming on to the handling jetty which I must say was enormously impressive, they were calling it the largest ship in the Navy, 85,000 tonnes of concrete. What order of additional costs will arise in terms of the jetty from the new contract agreed in August—by which I mean what is the final price?

(Mr Heyhoe) I think to give you the contract price, Chairman, we would be advised to give it to you in a note, if we may.

[Chairman *Contd*]

2166. Thank you.

(Mr Heyhoe) The overall price of the EHJ, as we see it at the minute, is some £220 million.

2167. What is the order of the increase, that is the most significant point?

(Mr Heyhoe) The order of the increase since last year?

2168. As it was agreed in August, you agreed a new contract in August?

(Mr Heyhoe) Yes, we did.

2169. What was the order of increase in costs?

(Mr Heyhoe) Just looking roughly at this, I think something between 12 and 15 per cent.

2170. How serious has the delay of a year been?

(Rear Admiral Davis) It means that the EHJ availability, as it fits into the rest of the boat's programme, is now very tight but nevertheless we intend that the facility will be ready on time and I do not believe it will affect the programme as a whole.

2171. What degree of confidence do you now have in meeting the nuclear safety case?

(Rear Admiral Davis) I think that is well on track, Chairman, yes. A considerable proportion of the work has already been completed.

2172. You are totally confident it will be ready in time?

(Rear Admiral Davis) I do not think with a safety case you are ever totally confident until the last piece of paper has a green tick on it, but as confident as we can be, yes.

2173. Again we were very impressed with what we saw, particularly with the changes we saw in Coulport. The one thing that slightly puzzled us was the generating station—we only saw the outside of it—can you give us some idea of why out of some £400 million worth of Coulport work that seems to have caused so much difficulty?

(Rear Admiral Davis) I think the delays of the Coulport generator station come down mainly to performance by contractors on the ground. I think in any large project you have a number of good and not so good contractors and in this particular case we are looking at the blacker side of the picture at Coulport. What we have done there is given assistance to the original contractor, who incidentally has been taken over during the course of this, to assist him in getting greater productivity from his subcontractors. We have been putting our own effort into that to bring it back on the programme.

2174. Is the delay serious?

(Rear Admiral Davis) Once again it means the generator station which provides all important power to the EHJ is very tight on the programme. By that I mean weeks. We do not have a lot of time in the programme. Needless to say, should it not be ready, we are contemplating alternatives.

2175. Have there been any serious cost overruns?

(Mr Heyhoe) On the generator station, Chairman?

2176. Yes.

(Mr Heyhoe) Since the Committee considered this subject last year there has been a cost overrun in the order of £10 million.

2177. I see. Turning now to Faslane, first the finger jetty. Can you tell us briefly how things are progressing on cranes and on the nuclear safety case?

(Mr Heyhoe) Could I, first of all, Chairman, help the Committee by giving an amended answer to your earlier question about the contract on the EHJ?

2178. Yes.

(Mr Heyhoe) The percentages I gave you were as a percentage of the new price. It is probably more helpful to you to have the figure which is the percentage increase on the then price, and that is about 30 per cent.[1]

2179. 30 per cent.?

(Mr Heyhoe) Yes. On the finger jetty and the cranes which you asked about just now, the work on the finger jetty itself is nearly complete and we would expect it to be handed over in the near future. The position with the jetty cranes is rather less satisfactory against the very stringent safety case requirements, but the PSA are working closely with the contractor to sort out any problems.

2180. When you say "less satisfactory", what is the problem?

(Mr Heyhoe) The principal problem is with the 125 tonne crane where in essence it is a question of balancing the strength of the crane against the weight it will impose on the jetty. That is the problem.

2181. How do you resolve that?

(Mr Heyhoe) You resolve it by getting the PSA working closely with the contractor to sort it out. I do not know how it will be done.

2182. That looks to me like an irresistible force and an immovable object. If it is too heavy what do you do, build another one?

(Rear Admiral Davis) No, I do not think that will be the case at all even though I have to say a 125 tonne crane is likely to weigh as much as 1,200 tonnes when complete. Although we have had problems in this area the contractor for the crane, who is different from that for the finger jetty, is now finalising the design which meets not only the requirement for the crane itself but also meets the safety case. It is the safety case which has been the

[1] *Note by Witness:* The figure should actually be 20 per cent.

[Chairman *Contd*]
problem. We have 125 tonne cranes which meet the safety case requirements. I do not believe we are going to see an insoluble problem here. It is the time it has taken to arrive at this optimum solution between the weight of the crane and the weight the finger jetty will support.

2183. I am puzzled because in order to meet the safety case the crane must be of a weight too heavy to go on the jetty?
(Rear Admiral Davis) If I gave that impression, I am sorry I am wrong.

2184. I think it is what Mr Heyhoe said I am in difficulty understanding.
(Rear Admiral Davis) If I take the words out of his mouth, what he was saying was, it is very easy to make a very safe crane, you make it very strong and hence it is very heavy. That is a simple task. You cannot go on doing that because you would eventually sink the jetty. You have to design a sufficiently strong and safe crane within the weight limitations, that is what NEI have all but now achieved.

2185. At what extra costs? Is this where costs start escalating which you cannot control because you have to meet the safety case?
(Rear Admiral Davis) We always have to meet the safety case, there is no question of not doing it.

2186. Whatever it costs?
(Rear Admiral Davis) We always look to minimise the costs but in the end we have to meet the safety case.
(Mr Heyhoe) There is no significant cost increase, Chairman, since last year on this.

2187. Then what is the difficulty?
(Rear Admiral Davis) The difficulty is one of time, Chairman, not one of cost.

2188. It is taking longer than you expected?
(Rear Admiral Davis) Correct.

2189. To design a crane strong enough and light enough?
(Rear Admiral Davis) Correct, that is necessarily it. In fact NEI are going to start assembling it off site and bring it in sections which will be a way of speeding things up.

2190. Are you finding these safety cases increasingly hard to meet?
(Rear Admiral Davis) Safety cases are always challenging, there is no doubt about that. The problem with a safety case is that at the very start of a project you do not know all the detail that is going to be required and sometimes it is not until the project proceeds that you pick up the necessary facts that might result in aspects having to be redesigned and relooked at. Of course once you have done that, you then have to revisit the safety case for the whole of that building or piece of equipment as well. You simply cannot change one bit; you have to revisit the whole of the case and that takes time and paper and money.

2191. Incidentally, did you have to take core samples from the finger jetty as well?
(Rear Admiral Davis) No, the piles are quite different there. They were driven straight into the seabed. There is a great layer of clay over granite, there is no question of drilling out sockets and pouring in concrete.
Chairman: Let us turn to the magnetic treatment facility, Mr McFall?

Mr McFall

2192. Can we run through this from the beginning. First of all, what are the comparable facilities for SSNs and Polaris SSBNs and are they too small for VANGUARD boats?
(Mr Hawtin) Yes, they are, Mr McFall. The current facilities are at number 2 berth in the Clyde submarine base and they are too small and insufficiently powerful to accommodate VANGUARD.

2193. In your answer 25 to the Committee you said you have paid £15 million now to terminate the contract, a contract which had an original estimate of £65 million, but because of a design evaluation study by the contractor you found it was exactly double, £150 million, is that correct?
(Mr Hawtin) That is correct. The result of the design evaluation study showed the cost had increased and we are talking about a cost of the magnetic treatment facility of £150 million with a slippage of 18 months.

2194. What was that time period from the first £65 million contract to finding it was double?
(Mr Hawtin) The contract was placed on 12 April 1989 and we discovered it was double in June 1991.

2195. Two years. What were the principal features of the magnetic treatment facility proposals and was the design and use unusual?
(Mr Hawtin) Yes, I think it was. The facility is required to remove the permanent magnetic signature that steel hull vessels acquire during construction. There is a requirement for new facilities for VANGUARD. We invited a number of contractors to look at how we might best meet that requirement on the basis of a number of possible options, the continuation of the close wrap facilities we use at the moment or what is called a drive in facility, which is what the US are building, which is the magnetic treatment facility that would have been moored in the loch.

2196. Your answer says the water current at the chosen site was more complex and therefore you ought to have that redesigned but it seems to me odd from knowing the Gareloch area and knowing the Royal Navy has had a presence there since 1963 that you now find the water current is more complex than you originally thought. It seems beyond belief to accept a statement like that?

[Mr McFall *Contd*]

(Mr Hawtin) There is no doubt with the benefit of hindsight a genuine and most unfortunate mistake was made. May I run through what happened? The original intention in 1989 was to site the magnetic treatment facility 25 metres from the sea wall at Faslane and the water current was measured at the dockside, was well understood, and it was 0.1 metres per second. It was subsequently decided a better location would be in the middle of the loch 305 metres offshore. At this point, unfortunately, the assumption was made that the water current in the middle of the loch was the same as that at the dockside.

Chairman

2197. Why was that decision made to move it out to the middle of the loch?

(Mr Hawtin) Because there were indications at that stage that locating it adjacent to the dock wall might result in interference with the actual nature of the facilities. There were steel piles in the dock wall which might, it was thought, interfere with it.

Mr McFall

2198. If you have consultants getting seemingly exorbitant fees surely to goodness, technologically speaking, should they not have known that in the first place?

(Mr Hawtin) The assumption the current was the same was based on the knowledge that prevailed at that time of the experience over many years in operating in the Gareloch and on the wind, tide and other such tables. The sad fact is there was no reason, it was judged, to believe the current was vastly different out in the middle. The location is well towards the head of the loch and it was believed the current would be of a comparable strength out in the middle. Unfortunately, as we now know with hindsight, it was not and it was some 0·4–0·6 metres per second. We also now know the current is considerably more complex and that it varies both in terms of speed, depth and direction as one moves out in the loch. We did not know that at the time and I am afraid an assumption which proved to be wrong was made.

Chairman

2199. Who was specifically responsible for that assumption?

(Mr Hawtin) The project was one managed within the Procurement Executive of the Ministry of Defence.

Mr McFall

2200. You will agree somebody got it horribly wrong and caused this waste of public monies?

(Mr Hawtin) I have to agree, a mistake was made. I cannot pretend otherwise, but I would say to the Committee as soon as that mistake came to light the Ministry took swift and appropriate action to investigate whether indeed the current was different and to minimise potentially nugatory spend. As soon as we had the results of the design study and it was quite clear the costs had escalated to a level we could not afford the contract was immediately cancelled.

2201. After £15 million has been wasted do you have anything beyond designs at the moment?

(Mr Hawtin) Can I go back to the question of costs?

Chairman

2202. Just before you get to that, why were the PE involved in this, why not the PSA? This is the first time they have been mentioned in this whole project.

(Mr Hawtin) The PSA had no involvement in this project. It is what we now term a hybrid project which has a major civil engineering works element in it and also a considerable amount of equipment which the Procurement Executive procure. We have, over a number of years, experienced difficulty with hybrid projects which have been managed, as it were, as two separate elements, works on the one hand and equipment on the other. It was decided, and this is now our normal practice for such projects, to appoint one project manager within the Ministry looking at both the works and equipment element and one prime contractor addressing both. Approaching the problem in that way one gets a much better integration of the two and a much better overview of the project.

2203. If you had done it that way this would not have happened?

(Mr Hawtin) No, in this particular project the contract let was one for design of the magnetic treatment facility and subsequent build. We, did not I think, actually get beyond the design problems we have talked about.

2204. This makes me surprised it should have been a PE man who made this wrong assumption. Presumably if the PE—Procurement Executive—were brought in for this they came in without all of the familiarity with that part of the world that those who had been working up there for years would have had. I am surprised.

(Mr Hawtin) The first mistake, as I have acknowledged, Chairman, was the assumption that the current which was measured and which we knew was 0.1 metres along the dock wall was the same.

2205. That was made by a PE man?

(Mr Hawtin) That was made by measurements.

2206. The assumption?

(Mr Hawtin) The assumption that it was the same was made by the PE project after they had consulted interested parties in the area, after they had consulted the authorities and operators on the spot.

2207. Who all agreed with that assumption?

(Mr Hawtin) And against the background of the data available. There was no suggestion, I have to say, that the assumption was wrong.

Mr McFall: The MoD agreed with that assumption, the Navy agreed with it, the water currents

[Chairman *Contd*]
were the same. The Navy did not realise the water currents half way up the loch were different. That is my constituency, I find it hard to believe. If you went out in a rowing boat, people would tell you what the difference was in the current.

Chairman

2208. We fully understand, Mr Hawtin, your difficulty and your frankness in acknowledging an error but saying "with hindsight"; you do not need hindsight to know current is different alongside as it is in the loch. Any small boat sailor will tell you that.

(Mr Hawtin) I understand the Committee's surprise. I have to say I shared it myself. All I can say is that the view at that time, and it was clearly wrong, was that since the location was up towards the head of the loch the currents would not be markedly different. The second factor that emerged during the detailed design stages and subsequent measurements was that the current varied both with direction and with depth.

2209. Any small boat sailor will tell you that.

(Mr Hawtin) There was no evidence, I am afraid, available to the project which was produced at the time, including boat operations in the loch, which suggested the current was markedly more strong in the middle.

2210. Perhaps a compulsory dinghy sailing course for PE executives in the future would be necessary. Before you answer Mr McFall's question about costs, do you have any other hybrid Trident projects?

(Rear Admiral Pirnie) I think under the definitions we use both the shiplift and explosive handling jetty would be classified as hybrid projects, and possibly the Northern Utilities Building?

2211. But none other?

(Mr Hawtin) I do not think so, Chairman, but if we are wrong can we come back to you on that?

2212. It is perhaps a coincidence these are the ones which cost of late. Is there a lesson for us in the future?

(Rear Admiral Pirnie) One could also say the individual training facilities, in particular the Royal Navy Strategic Systems School you saw might today be treated as a hybrid project because so much of the equipment in there is related to the structure of the building.

2213. Right.

(Mr Hawtin) If I could emphasise as far as the magnetic treatment facility is concerned, we had not got to the point of the construction of the work when the problems arose over this error. We also, I am afraid, put in the invitation to tender in the cardinal point specifications which went out to industry, the figure of 0.1, which is why we then had the subsequent difficulties with the contractor. The position is the contract was cancelled on 24th June 1991. A contractor under the terms of it may be reimbursed for all work done and for reasonable commitments entered into. I am sure it will not surprise the Committee to know we are still negotiating that final settlement with the company but if it would help the actual payment is £15.3 million or 23 per cent of the contract which was up to and including the point of cancellation and £3.5 million on account against final settlement. There was a separate contract for the design evaluation study of £1.8 million.

Mr McFall

2214. Do you have anything beyond designs at the moment?

(Mr Hawtin) In terms of the way ahead?

2215. Yes?

(Mr Hawtin) We are obviously looking urgently at that and our intention is to proceed in two stages. The first will be to provide an interim solution using the traditional close wrap methods for the Trident submarines which we would expect to be alongside number 10 berth. That will be using the traditional close wrap methods and we are quite confident that will be in place in time to meet the requirements for the first Trident submarine. As far as the longer term is concerned, we will be commencing feasibility studies towards the end of this year into what permanent arrangements might be appropriate. They will take account, amongst other things, of the outcome of short-term methods, and what our assessment of that is.

2216. Finally, maybe a little bit more probing into how you got bounced into this in the first place. You say you have low cost, operationally adequate alternatives, also "less environmentally obtrusive", so why the magnetic treatment facility in the first place? The MTF, according to the MoD and others, was environmentally obtrusive. If you can design something less environmentally obtrusive it seems odd you thought of MTF in this location in the first place?

(Mr Hawtin) We went out to a number of companies and we asked them to come up with a technically sensible solution. The four who responded all came up with a drive in facility and we were satisfied, at that point, that it was a cost-effective way to meet our requirement and that in particular it met what, at that stage, was a requirement for a very rapid turn around, a maximum of 48 hours. One of the disadvantages of the close wrap system is it is manually intensive and takes more time. What has changed are three things. What was cost-effective and affordable by way of meeting the requirement at £65 million ceased to be so at the time when it became £150 million with a slippage of 18 months. Secondly, we were faced with a smaller number of submarines, in toto to treat Post Options. Although the facility was intended for the VANGUARD submarines it was also to be used by SSNs and SSKs but we now plan to have a smaller submarine fleet. Thirdly, the indications are that deperming action might be necessary less frequently so a swift turn

[Mr McFall *Contd*]

around time of 48 hours, which was the key advantage of the drive in facility, is less important. So taking all those factors together, we now consider that the interim solution based on the manual close wrap method will be a much more cost effective way of achieving it and that we estimate will cost us around £4 million.

Chairman: Let us turn to the Atomic Weapons Establishment.

Mr Cartwright

2217. You have given us a helpful note about the problems of the corroded pipe work in building A91, can you assure us this will not have any impact on the production of warheads for the Trident programme and there is no penalty to be paid for the existing use of waste treatment facilities?

(Mr Beaven) I can give you the assurance you are looking for on the impact of the problem on the Trident programme. The second question——

2218. ——whether you are going to continue to use the existing waste treatment facility, is there any penalty to be paid for that?

(Mr Beaven) There is a small penalty in that we have had to do extra maintenance work to give assurance these facilities will continue in use for the period of time we expect to use them. That is a relatively small amount of money, not a significant sum of money.

2219. The Secretary of State told us the bulk of the new production facility, the A90 building, has been handed over?

(Mr Beaven) Yes.

2220. Can you give us a little bit more detail: what has not been handed over, why not, when will it, and is there any problem arising from that?

(Mr Beaven) The A90 building, it has a number of tasks other than support production of warhead components. It was never intended those other parts would be completed in the same timescale. The parts which are needed to support the production have been handed over, the other parts of it are not as significant and it was never intended that they would be handed over in the same timetable.

2221. I am sure you will be aware of the Committee's concerns over a period about the problem of recruiting and retaining skilled labour at AWE at Aldermaston and Burghfield. You have given us figures which show a welcome reduction in the number of vacancies. Can you assure us how that has arisen? Is it that you have reduced the ceiling on the number of employees or is it a genuine improvement in the situation?

(Mr Beaven) It is a number of factors. You will appreciate with the changed economic circumstances both resignations have reduced,and recruitment has improved, plus our interim management contractor has reassessed what he believes is necessary in order to complete the programme and he has brought the ceiling down a bit as well. If you take those three factors into consideration that results in the reduced number we have given.

2222. You have been very frank about the impact of the recession. At some point or another we are going to come out of the recession, how do you see the situation with the recruitment and retention there?

(Mr Beaven) One of the activities we asked the interim contractor to do for us was to carry out a review of pay and conditions currently applying at Aldermaston and giving recommendations as to what he thought was necessary in order to not only stabilise the workforce but to be able to recruit and retain skill levels and the mix of disciplines needed to support the Trident programme in the future. These recommendations he has made to us which we are currently considering and have put some proposals to the Treasury. When the results of that discussion are known we may very well make some adjustments to the pay and conditions of the people at Aldermaston.

2223. You have not increased the special pay conditions since 1989, do the recommendations involve some improvement?

(Mr Beaven) These recommendations cover a wide range of aspects on pay and conditions, one is the special pay conditions and the reason we have not changed them is because we are looking at the problem across the board and we will make a series of changes to take into account all aspects of pay and working conditions at Aldermaston. The current SPAs will be taken into consideration in that negotiation.

2224. Finally, I am sure you are aware of the suggestion that the problems at AWE will mean although the full complement of warheads for the first Trident submarine can be provided there will be difficulties in providing the full complement of warheads for the subsequent submarines as they come into operational service. Can you assure the Committee on that point?

(Mr Beaven) We do not see any reason why the current programme should not be achieved.

2225. You will be able to provide the warheads needed for each submarine as it comes into service?

(Mr Beaven) Yes.

Chairman

2226. Turning finally to research. You have given us a useful answer on progress on contractorisation and also a timetable for the future. As you know, one of our anxieties has been management of research. I was wondering how far you have got? Have you followed up the NAO's and PAC's recent criticisms? Putting it simply but a little crudely, have you got nuclear warhead research under some sort of control?

(Mr Beaven) Certainly. We are aware of the criticisms of PAC and your own Committee. In the past research work at Aldermaston has been defined

[Chairman *Contd*]
under a number of tasks and a number of broad headings. That has been translated at Aldermaston into a detailed programme and they have then produced several thousands of work block elements. As a first step to understanding the programme Hunting-BRAE have generated a research management plan and this bridges the gap between broad assumptions and detailed plans. That gives us a much better visibility and understanding of the actual work Aldermaston are proposing to do and how that relates to our requirements and will enable us in the future to make much more well explained and well reasoned decisions about what work we wish to carry on rather than what the establishment proposed to give us.

2227. Thank you. Mr Hawtin, gentlemen, thank you very much indeed. That is the end of a very useful, long and detailed session.

(Mr Hawtin) I was remiss in not highlighting one key lesson we learned from the magnetic treatment facility incident. That is in the future when we come out with a cardinal point specification for industry we will make them responsible for checking the current and that kind of measurement and not specifying from the Ministry's point of view what we thought it was. We will put the onus and the risk on the industry. That is one very important lesson I should highlight.

Mr McFall

2228. That seems a commonsense point.

(Rear Admiral Pirnie) As a footnote could I update you: VANGUARD is now afloat in the water.

Chairman: Could I tell you England won by eight wickets. We have both had notes passed to us in this session! Thank you very much. This is probably our last evidence session in this Parliament, one never knows. May I thank you for turning up in such force so that you were able to meet our questions. May I thank those in the Ministry of Defence, not least those in the Parliamentary office, who go to so much trouble and are very patient with our demands in evidence sessions. We are very aware we put an extra load on the Ministry of Defence but, on the other hand, I hope you are aware that is our job. Long may this close co-operation and close questioning between the Committee and the Ministry continue, whoever is here after the General Election. Thank you very much.

WRITTEN EVIDENCE

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

1. Report on Trident by the Ministry of Defence (4.2.92)

1. The programme to replace Polaris in the mid-1990s with the Trident II Strategic Weapon System continues on schedule, and within budget.

The Submarine Programme

2. The Invitation to Tender for the contract to construct the fourth Vanguard Class submarine, SSBN 08, was issued to Vickers Shipbuilding and Engineering Ltd (VSEL) in July 1991. The company's response has been received, and is being evaluated. Construction of the three vessels already ordered is going well, with all on schedule to meet their planned in-service dates. VANGUARD is now substantially complete and will be launched early this year. VICTORIOUS' hull has been fully assembled and welded, and outfitting, including installation of the missile launch tubes, is making satisfactory progress. The front and centre sections of VIGILANT's hull have been welded together, and the stern section delivered.

Strategic Weapon System

3. The US Navy have now successfully deployed three Ohio class Trident II submarines into operational service. Delivery, installation and testing of Strategic Weapon System equipment for the Vanguard class submarines is proceeding to schedule.

Tactical Weapon System

4. The development of the submarine's Tactical Weapons Systems (TWS) is making steady progress; final testing and integration of the systems is underway in the Shore Development Facility at Barrow and in VANGUARD. Since the last report, significant progress has been made towards resolving the remaining development issues with the Sonar suite, and the final design review of the system was held in the autumn. The second issue of the software to be used by the Submarine Command System (SMCS) is now being tested, but there is now very little contingency remaining in the SMCS development programme. The TWS production programme remains on schedule to support VANGUARD's deployment.

Warhead

5. Production of fissile material in existing facilities, and commissioning of new facilities at the Atomic Weapons Establishment continues to programme. The bulk of the new production facility (A90) has been handed over by the contractor and is now undergoing preliminary commissioning. The AWE Act, which provides for full contractor operation of the establishment, was granted Royal Assent in July 1991 and passed into Law in September.

Trident Works

6. Much progress has been made over the last year, with a significant number of facilities having been handed over, and others nearing completion. Early in 1991 Bovis Construction Ltd were commissioned to undertake an independent technical audit of the Trident Works programme to measure progress and assess future risks to the programme. The Government has accepted and implemented the company's main recommendations. The contract for the floating Explosives Handling Jetty was revised in the summer, and good progress against the new programme is being made.

Jobs

7. It is assessed that on average the Trident programme will provide 7,000 direct and 5,500 indirect jobs over its total procurement period, and 14,500 direct and 11,500 indirect jobs during the peak years of the programme (1990-1993).

UK Industrial Participation in the US Trident Programme

8. By the end of September 1991, British firms had been awarded 557 contracts with a value of some $180 million. There remain opportunities for further orders during the production phase of the programme.

Cost Estimate

9. The cost of the Trident programme is now estimated at £10,518 million. As in previous years, the whole estimate, including payments already made, has been brought up to current prices and is based on the exchange rate used for the long term costing of the defence programme, which this year is £1=$1.59. The table shows the main changes between the previous estimate of £9,863 million.

10. Although the revised estimate represents a cash increase of £655 million compared to the 1991 estimate, project costs have decreased marginally in real terms by £17 million; increases in some areas have been offset by reductions elsewhere and good overall progress on the project has allowed levels of contingency to be reduced. The proportion of the programme to be undertaken in the United Kingdom has increased from 71 per cent to 72 per cent.

11. Expenditure on the Trident programme to 31 March 1991 represented 40 per cent of the revised estimate. If this already incurred expenditure is expressed at historical prices and exchange rates (£4,246M), the equivalent total estimate is now £9,571 million. The comparable figure last year was £9,274 million. Expenditure is expected to represent 56 per cent of the total estimate by 31 March 1992.

12. The proportion of the Defence budget which the Trident programme takes over its 20 year procurement period has reduced from 3 per cent to less than 2½ per cent on average.

ESTIMATE TABLE

	US		*UK*	*TOTAL*
	£M	*($M)*	*£M*	*£M*
Previous estimate (February 1991) at £1 = $1.56	2,864	4,468	6,999	9,863
Real changes at £1 = $1.56 1990-91 prices	−3	−5	−14	−17
Price inflation	+137	+214	+592	+729
	(4.8%)		(8.5%)	
Exchange Rate Variation	−57			−57
Revised Estimate at £1 = $1.59 1991-92 prices	2,941	4,676	7,577	10,518
US/UK percentage	28%		72%	100%

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

	1991	1992
1. Submarine (less weapon systems equipment)	35%	36%
2. Weapon system equipment including Tactical Systems	19%	20%
3. Missiles	10%	9%
4. Shore construction	10%	11%
5. Warhead, miscellaneous, unallocated contingency etc	26%	24%

2. Memorandum submitted by the Ministry of Defence (13.2.92)

A. 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 27 February 1991, published in the Committee's Eighth Report of Session 1990–91, HC 286, page 19 (The 1991 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	1,645	3,660	5,305
Exchange Rate Variation	592	—	592
November 1981 Estimate (1991–92 prices $1.59)	5,550	7,867	13,417
Kings Bay Savings (91–92 prices $1.59)	−340	−685	−1,025
Other Real Cost Changes (91–92 prices $1.59)			
(1) Submarine	−235	−917	−1,151
(2) Strategic Weapon Systems (SWS) Equipment	−464	11	−454
(3) SWS Missiles	−803	−35	−838
(4) Tactical Weapon Systems (TWS)	3	274	277
(5) Shore Construction (excluding Rosyth)	—	696	696
(6) Rosyth Works & Functional Machinery	—	55	55
(7) Warhead, Miscellaneous & Unallocated Contingency	−771	312	−458
Current Estimate (91–92 prices $1.59)	2,941 (28%)	7,577 (72%)	10,518

Notes:
1. Costs are non-hybrid. Figures rounded to nearest £ million, hence any apparent imbalances.
2. The real cost changes also include minor transfers for accounting purposes to reflect the re-organisation of responsibility for functional machinery.

b. Breakdown of costs

	Nov 1981 Estimate (£M) Sept 81 prices $1.78			1981 Estimate (£M) 91–92 prices $1.59 (Note 2)			Current Estimate (£M) 91–92 prices $1.59 (Note 2)		
	US	UK	Total	US	UK	Total	US	UK	Total
Submarines	267	2,333	2,600	445	4,517	4,962	210	3,600	3,810
SWS Equipment	918	74	992	1,493	128	1,621	1,029	139	1,168
SWS Missile	1,275	44	1,319	1,791	35	1,826	988	—	988
Tactical Weapon System	—	326	326	—	613	613	3	887	890
Shore Construction	—	579	579	—	492	492	—	1,188	1,188
Rosyth Works & Functional Machinery	—	—	—	—	83	83	—	137	137
Warhead, Miscellaneous & Unallocated Contingency	853	851	1,704	1,482	1,314	2,795	710	1,627	2,337
Totals	3,313 (44%)	4,207 (56%)	7,520	5,210 (42%)	7,182 (58%)	12,392	2,941 (28%)	7,577 (72%)	10,518

Notes:
1. All figures are non-hybrid and rounded to nearest £ million, hence any apparent imbalances.
2. Columns 2 & 3 include savings resulting from the decision to process missiles at Kings Bay.

Explanation of Changes (Totals)

	US	£M UK	Total
November 1981 Estimate (September 81 prices $1.78)	3,313	4,207	7,520
Price Inflation	1,645	3,660	5,305
Exchange Rate Variation	592	—	592
Kings Bay Changes	−340	−685	−1,025
Cost Changes	−2,270	395	−1,874
Current Estimate (91–92 prices $1.59)	2,941	7,577	10,518

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 $8,284M at current price levels)			Current Estimate (£M) (dollar content of $4,676M at current price levels)		
	US	UK	Total	US	UK	Total
1. $1/£1	8,128	7,182	15,310	4,676	7,577	12,253
2. $1.25/£1	6,502	7,182	13,684	3,741	7,577	11,318
3. $1.50/£1	5,523	7,182	12,705	3,117	7,577	10,694
4. $1.59/£1	5,210	7,182	12,392	2,941	7,577	10,518
5. $2/£1	4,142	7,182	11,324	2,338	7,577	9,915

Total estimates include savings resulting from the decision to process missiles at Kings Bay.

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

A2.

(i) Expenditure on Trident up to November 1991 is:
  (a) £3,913 million in UK.
  (b) £1,161 million in US.

(ii) Commitment on Trident up to November 1991 is:
  (a) £4,931 million in UK.
  (b) £1,718 million in US.

Note: all figures are hybrid.

Q3. The Committee would be grateful for an updated version of the summary of gross increases and reductions in real costs for the UK and US parts of the programme given in Answer 3 on page 20 of the 1991 Report.

A3.

	£M 1990-91 prices $1.56		
	US	UK	Total
Submarines	−14	47	33
SWS Equipment	−22	1	−21
SWS Missile	24	0	24
TWS	1	36	37
Shore Construction (excluding Rosyth)	0	145	145
Rosyth Works & Functional Machinery	0	−18	−18
Warhead, Miscellaneous & Unallocated Contingency	7	−224	−217
Totals	−3	−14	−17

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

Q4. The Committee has requested an updated version of the table of annual expenditure on Trident and Polaris given in Answer 4 on page 21 of the 1991 Report.

A4. The estimated expenditure for 1991–1992 is as follows:

Trident	£1,160M
Polaris	£210M

Q5. * * *

A5. * * *

Q6. How much has been spent on SSBN 05, SSBN 06, SSBN 06, SSBN 07 and SSBN 08 respectively, up to the latest date for which this information is available?

A6. Expenditures to December 1991 at hybrid prices are as follows:

	£M
SSBN 05	888
SSBN 06	380
SSBN 07	311
SSBN 08	138

Q7. Has there been any change in the contingency allowance for each element of the programme or in the unallocated contingency allowance since the 1991 Report?

A7. Contingencies included within each programme element at 91–92 prices and $1.59 are as follows (last year's figures at 90–91 prices and $1.56 in brackets):

	£M	(£M)
(a) Submarine	112	(122)
(b) Strategic Weapon System	39	(81)
(c) Tactical Weapon System	2	(18)
(d) Shore Construction (Excluding Rosyth)	44	(55)
(e) Rosyth Works & Functional Machinery	13	(13)
(f) Warhead, Miscellaneous and Unallocated Contingency (of which Unallocated Contingency is £356M (£437M))	360	(494)

Q8. The Committee has asked for an updated version of the table provided as answer 8 on page 21 of the 1991 report on the phasing of Trident expenditure.

A8. Trident expenditure by period (lines (a) and (b) at hybrid prices, and lines (c) and (d) at 91–92 prices and $1.59):

	£M	
	UK	US
(a) 1980–81 to 1984–85	183	176
(b) 1985–86 to 1989–90	2,214	634
(c) 1990–91 to 1994–95	3,319	1,299
(d) 1995–96 onwards	1,043	703

Note: These total to the hybrid project total estimate of £9,571 million. Figures rounded to nearest £ million.

Q9. What is expenditure on the Trident programme expected to be in (a) 1992–93 and (b) 1993–94?

A9. Forecast expenditures at 1991–92 prices and $1.59 are as follows:

(a) 1992–93 £1,019 million
(b) 1993–94 £827 million

B. PROGRESS AND IN SERVICE DATES

Q10. What is the state of progress on each of the four Vanguard class submarines? What is the situation with regard to the order for SSBN 08?

A10. SSBN 05 (VANGUARD) continues to make satisfactory progress, and remains on schedule to meet her planned in-service date. VANGUARD'S "roll-out" from the covered Devonshire Dock Hall, and lowering into the water using the Barrow shiplift, is expected to take place early in March. Setting to work of Tactical and Strategic Weapon System equipments has made good progress; loading of the reactor core into the submarine, and commissioning of the Nuclear Steam Raising Plant has been completed. Outfitting and installation of equipments into SSBN 06 (VICTORIOUS) continues to make good progress. The submarine hull is now complete. Fourteen missile launch tubes have been installed, and assembly of the rudder assembly is underway; VICTORIOUS remains on schedule to meet her planned in-service date. Construction of SSBN 07 (VIGILANT) is going well and remains on programme with all hull units now in the Devonshire Dock Hall. The gearbox has been completed, and construction of the missile area superstructure has started. Steelwork production and assembly of sub-frames for the fourth submarine (SSBN 08) continues to make good progress under long lead funding arrangements.

The invitation to tender for the contract to construct SSBN 08 was issued to Vickers Shipbuilding and Engineering Ltd (VSEL) in July 1991, and the tender received in October. Contract negotiations with the company are now in progress.

Q11a. An article in the Times purportedly based on an interview with the First Sea Lord on 29 October 1991 stated "The first Trident boat is due to come into service in December 1994. Sir Julian said that deadline would be met". When do Ministers propose to make a formal public announcement of either an approximate or a precise ISD for HMS VANGUARD?

Q11b. In the event of problems with the Polaris submarines making it difficult to maintain at least one boat on patrol all the time, is it technically possible that the entry into service of HMS VANGUARD could be brought forward from the originally planned date?

Q11c. When did HMS VANGUARD's contractor sea trials begin, and for how long are they likely to continue?

A11a. VANGUARD is expected to enter service towards the end of 1994 or early in 1995.

A11b. We plan to maintain continuous deterrent patrols with Polaris submarines until VANGUARD enters service. There is limited scope for bringing forward VANGUARD's in-service date.

A11c. VANGUARD's Contractor's Sea Trials are currently scheduled to start at the end of September 1992, and are expected to last some three months.

C. TACTICAL WEAPON SYSTEM

Q12. What progress has been made in resolving the outstanding problems with the Tactical Weapons System described in evidence to the Committee in its 1990–91 inquiry?

A12. Substantial progress has been made over the past year in resolving the outstanding problems with the Tactical Weapon System.

Solutions in the sonar suite have been found to all the major development problems in the inboard equipment, including the unsatisfactory failure rate of the processing computers. New, though more minor, problems have emerged during testing and integration in the Shore Development Facility but solutions have been identified and will be incorporated in subsequent issues of software this year. Final design reviews for individual equipments and for the sonar system as a whole have been successfully completed; clearance of deficiencies is expected by the middle of this year. Setting to work of the sonar on board VANGUARD has been successfully completed. Progress on the inboard equipment has been very encouraging: full confidence will only be achieved when sea-trials have been successfully completed.

Progress with the Submarine Command System (SMCS) is addressed in the answer to Question 13.

A full Harbour Trial of the Tactical Weapon System in both the Shore Development Facility and in VANGUARD will take place early in the summer 1992.

Overall, we remain confident that the Tactical Weapon System will be able to support VANGUARD's Contractor's Sea Trials. The subsequent programme through to initial deployment has very little contingency but will meet the overall requirements of the programme.

Q13a. Is the programme agreed with the contractors for the development of the SMCS software (referred to in answer 14(b) on page 22 of the 1991 Report) being met?

Q13b. Did the issues of integration software take place as planned during 1991?

Q13c. Is the timetable as set out in Answer 14(c)(i) on page 23 of the 1991 Report for the full integration programme still valid?

Q13d. What is the current situation with regard to slippage in the Sonar 2054 development contract?

A13a/b. The two further issues of SMCS software planned for 1991 were delivered but the second did not include adequate performance to support Contractor's Sea Trials. A further issue, incorporating improved performance, will be released shortly within the existing contract.

The benefit of the new software tools has been substantial although some problems continue to be identified. Further restructuring of the software delivery programme beyond Contractor's Sea Trials has been necessary because of delays in the development of infrastructure software and the need to improve the functionality of the planned early issues. The revised programme has been agreed with the contractor and will meet the submarine programme.

A13c. Integration testing has continued to reveal a number of design deficiencies in the Tactical Weapon System equipments. The corresponding extra work to rectify the observations has delayed full integration of the system in the Shore Development Facility to the summer, and the lead time over equivalent testing in VANGUARD has been reduced to one month.

A13d. Despite the good progress made over the last year, we now estimate that the slippage to the Sonar 2054 development contract is in the region of three years. We continue to expect that the Sonar 2054 production programme will support the requirements of the Vanguard Class programme.

D. STRATEGIC WEAPON SYSTEM

Q14a. Have the deferred missiles referred to in Answer 15 on page 23 of the 1991 Trident Report been included in the production order for US Fiscal Year 1992?

Q14b. Have there been any other changes to the UK's planned programme of missile purchases and if so, what are the implications for the planned missile outload dates?

A14a. Yes.

A14b. UK missile procurement is being and will continue to be timed to meed UK missile outload dates. Subject to this constraint, the procurement programme continues to be kept under review to ensure that requirements are met in the most cost effective manner.

Q15a. In its Fifth Report of Session 1988–89, at paragraph 41, the Committee concluded that "if information on the procurement by the UK of Trident missiles becomes officially available to the US public, it will be incumbent upon HMG to make similar information available in the UK". In view of the House of

Representatives Armed Services Committee Press Release of 1 November 1991 referring to "the planned British buy of 23 missiles", the Committee wishes to know if Ministers propose to make information public on the number of missiles to be bought in total, or in a single year.

Q15b. What level of funding has the US Congress authorised for the Trident D5 missile programme for FY 92?

A15a. The UK planned total buy remains classified. Purchases of 3 missiles were made in US Fiscal Year 1990 and of 23 in Fiscal Year 1992.

A15b. The US Congress granted some $977 million for the procurement of 28 Trident II D5 missiles and related costs for Fiscal Year 1992.

Q16a. What are the cost implications for the UK of the US Navy decision to defer its programme to retrofit the Trident II (D5) system and missiles into existing Trident I (C4) hulls?

Q16b. What in percentage terms, has been the overall effect on the cost of missiles to the UK of the various changes so far made in the US Trident II (D5) missile programme?

A16a. We assess that, at US Fiscal Year 1992 prices, the additional gross cost of this revision is in the order of $105 million, although offsetting savings have been identified elsewhere in the Strategic Weapon Systems programme.

A16b. Excluding the savings resulting from the decision to process missiles at Kings Bay, the real cost of the procurement of missiles from the US has reduced by £803 million since 1982. We estimate that further savings equivalent to about 5 per cent of the current cost would have been achieved but for the changes made to date to the US Trident II D5 missile programme.

Q17. What nuclear tests have been conducted on behalf of HMG during 1991? The Committee has asked for details of the tests, including yields. Are any further tests planned?

A17. There has been one nuclear test conducted on behalf of HMG during 1991. This was carried out on 26 November 1991. The test had a yield of less than 20 kilotons, and was required in order to maintain a minimum nuclear deterrent and to ensure that our nuclear weapons are safe and effective. Although analysis of the data is continuing, all indications are that the test was successful. We expect to undertake further tests in due course.

Q18. Is AWE still on schedule to meet the first warhead deliveries at the end of 1992?

A18. Yes.

Q19a. The Committee has asked for a classified version of the Chief Scientific Adviser's Report on nuclear weapon safety.

Q19b. What steps has the Chief Scientific Adviser's working group on the safety of UK nuclear weapons taken to consult the relevant US Government Departments and laboratories on the issues raised by the Drell Report on nuclear weapons safety? What formal meetings have taken place; and what specific correspondence between the Ministry of Defence and US officials or scientists has there been on this issue?

A19a. Ministers have not yet received the report.

A19b. There are frequent exchanges between UK and US officials on matters relevant to nuclear weapons safety, including issues raised by the Drell Report. The Chief Scientific Adviser's working group have had full access to relevant information. The Chief Scientific Adviser and Dr Drell have discussed a range of subjects covered by the review team's work.

E. POLARIS

Q20a. Which of the four Polaris submarines has a current safety certificate issued by the Nuclear Powered Warships Safety Committee?

Q20b. Do any of the certificates impose limitations—whether of a technical or geographical nature—on the operation of the boats they cover?

A20a & b. The Nuclear Powered Warships Safety Committee (NPWSC) does not issue safety certificates. The safe operation of the Royal Navy's submarines is the responsibility of Her Majesty's Government and the necessary authorisation for such operation is issued by the Ministry of Defence. As the Government has repeatedly made clear, no submarine, including those of the Polaris force, would be permitted to operate unless it were considered safe to do so. As members of the Select Committee are aware, following the discovery of a technical defect in HMS WARSPITE that had *potential* safety implications, further prudent precautionary measures have been taken to ensure the continued safe operation of the Royal Navy's nuclear submarines. All nuclear submarines are being inspected and cleared for deployment as required to meet military commitments. The safety cases for their operations are, in all instances, subject to the specific approval of MoD technical and safety experts and to the endorsement of the NPWSC, which provides the MoD with independent expert safety advice on the nuclear submarine programme.

Q21. When will a final decision be taken on whether to proceed with a final refit of a Polaris boat?

A21. The decision to pay off HMS REVENGE at the end of her present commission was announced on 9 December 1991. No further refits of Polaris submarines are planned.

F. WORKS

Q22. The Committee would be grateful for an updated version of the figures for individual construction programmes and attribution to Trident given in Answer 27, page 24 of the 1991 Report.

A22. Estimates can be broken down as follows:

	Related	£m Attributable
a. Coulport	504	503
b. Faslane	599	196
c. Clyde Submarine Base Externals (Roads and Utilities)	66	63
d. Rosyth	367	83
e. Elsewhere	20	18
Totals:	1,556	863

Notes:

a. The estimates are shown on a hybrid basis—ie expenditure prior to 1991/92 is at historical prices, and 1991/92 and future costs are at current (1991/92) prices.

b. To the figure of £863 million must be added contingencies (£57 million) and PSA Resource Costs (£217 million), £157 million price variation on sunk costs, and £31 million for functional machinery in order to arrive at the total of £1,325 million, which reflects the provision for shore construction, Rosyth works and functional machinery as set out in the answer to Question 1(b).

Q23. What large contracts have been let in the past year?

A23. One contract with a value of over £5 million has been placed in the last year, and is as follows:

Contract	Date Awarded	Contractor	Contract Sum (including VAT)
Rosyth Refuelling and Refitting Facility (RD 57) Phase 2B Works	29 October 1991	G Mowlem Construction Ltd	*

Q24a. What steps is the Department taking to implement the recommendations of Bovis Construction Ltd's technical report on the Trident Works Programme, as conveyed in paragraph 10 of the Government's reply to the Eighth Report of Session 1990–91?

Q24b. When does the Government expect the implementation of the recommendations to be completed?

Q24c. The Committee has asked for a copy of the Bovis Construction Ltd report, under the usual conditions.

A24. The principal recommendations of the report on the Trident works programme commissioned by the Department from Bovis Construction Limited have been implemented progressively since its receipt in March 1991.

The report's main thrust confirmed MoD's assessment of the requirement for tauter management control and recommended ways in which this requirement might be met.

This improved control regime has been enforced in a number of ways, principally:

a. The Ministry of Defence has instituted a virtual design freeze across the programme, allowing no changes except for practical engineering or essential nuclear safety and availability reasons. All significant changes must be authorised by a single designated authority within the Ministry of Defence.

b. The Department's presence and expertise at the Clyde Submarine Base has been strengthened. A professional engineer has been appointed to lead a team of some 40, mainly technical, personnel who provide oversight of the works progamme on-site. The team includes financial advisers. Operating under delegated authority, he is able to consider promptly the majority of PSA proposals taking into account programme requirements and cost-effectiveness. Major issues are resolved at the appropriate level in MoD, taking into account advice from the Clyde Submarine Base supported as necessary by internal technical expertise.

c. Within the Clyde Submarine Base team, additional expertise is being built up in the area of nuclear safety. The Department is giving increased assistance to the PSA in providing the documentation required to support the nuclear safety case.

d. The Department has established structured meetings at various levels involving the PSA and their consultants (including Wimpey, the Construction Programme Co-ordinators) to monitor physical progress and financial forecasts and outturn. At Faslane, the senior MoD representative chairs the senior on-site management body, the Trident Works Progress Committee, which meets monthly.

e. A team of four Bovis personnel has been retained to support the MoD team at Faslane.

f. The programme continues to be monitored closely and regularly by Ministers and senior officials.

The Report by Bovis Construction Ltd on the Trident Works Programme is an integral part of the internal advice presented to Ministers on this subject; it would not therefore be appropriate for a copy of the Report to be released. The Report's principal recommendations were of course published in the Government's response to the Committee's Report last year.

The Department recognised that there were difficulties with certain Trident works projects and it was for this reason that we sought an independent report. Bovis were invited to carry out a review of the project and we made clear that we were looking for a frank and comprehensive report. Bovis produced such a report which identified weaknesses in a number of areas. We regard it as extremely helpful. Most of the recommendations have been agreed and implemented; a number will require continuous implementation until the Trident works programme is complete.

Q25a. What was the total expenditure on the Magnetic Treatment facility?

Q25b. Did the cancellation of the contract for the facility incur any costs, for example in the form of penalty costs or other compensation to the contractor?

Q25c. What would have been the cost of continuing with the facility and how did this compare with the original estimated cost?

Q25d. What are the reasons for the increase in the estimated cost of the facility and for likely delay in its entry into service?

Q25e. What progress has been made in deciding on alternative methods of controlling the magnetic signatures of the UK's Trident submarines?

Q25f. What arrangements have been made for the magnetic treatment of the submarines until long term arrangements can be set in place?

A25a. Payments on the Magnetic Treatment Facility totalled approximately £15 million when the decision was taken to terminate the design and supply contract.

A25b. The Ministry of Defence exercised its right to cancel under a specific provision of the contract and incurred no penalty costs. The provision (MoD Standard Condition 56) requires the Department to reimburse the contractor for all reasonably and economically incurred costs. The Company's submission for such costs is being investigated.

A25c. A design evaluation study undertaken by the contractor suggested a revised total cost of approximately £150 million at 1991/92 prices, inclusive of VAT. This was more than double the original estimate (approximately £65 million at the same price base).

A25d. Work on the Magnetic Treatment Facility was halted in September 1990 following the discovery that the water current at the chosen site was more complex, with a significantly stronger maximum level, than had been assumed when the contract specification was drawn up. A design evaluation study was commissioned to determine the impact of this change on the contractor's design and the likely cost and time implications. The results, which were submitted to the Department in May 1991, showed that a major redesign would have been necessary to produce a structure capable of withstanding a stronger water current and the consequently increased docking forces by vessels during treatment. The facility was deemed to be unaffordable at the increased cost and the decision was made to examine more cost effective alternative arrangements.

A25e/f. Satisfactory progress has been made in defining proposals for an interim system for initial magnetic treatment of the first Vanguard class submarines; a decision is expected to be taken shortly. At the same time, proposals will be considered for studies into a longer term solution for the treatment of Vanguard class, and other Royal Navy submarines, but experience gained with the proposed interim system will be taken into account before a decision is made.

Q26. Why has it proved necessary to mount a special dredging operation at Barrow-in-Furness in order to accommodate Vanguard class submarines? What are the costs of the operation and by whom will they be borne?

A26. It has always been recognised that the Barrow exit was not sufficiently deep to permit the safe passage of a vessel with the draught of the Vanguard class submarine. Dredging of the channel represented the most cost effective means of overcoming this constraint.

The cost of the dredging contract is currently assessed at * * * The cost will be borne by MoD.

Q27a. What progress has been made in dealing with the difficulties encountered in the Explosives Handling Jetty construction programme?

Q27b. By how much has the programme been delayed and when is it expected to be completed?

Q27c. What is the situation with regard to the safety case for the facility?

A27. Construction of the Explosives Handling Jetty (EHJ) has continued to make steady progress over the past year, and the facility is now well advanced. Following the signing of a revised contract in August 1991, the EHJ is now due to complete its construction and commissioning in November 1992; this will be followed by a period of trials and training to make the facility and its crew fully operational. The revised date meets the requirements of the Trident programme, but represents a slippage of just over a year when compared to the original contract completion date. The establishment of the safety case for the facility continues to programme.

Q28. What remedial action has been taken to deal with the problems and delays encountered in the Northern Utilities Building at Faslane and the generating station at Coulport?

A28. Considerable progress has now been made on both projects. The contract strategy for the Coulport Generating Station and Distribution System has been revised. The lead consultant, in conjunction with the main contractor, has produced a commissioning programme to contract completion, and instructs the contractor as necessary to achieve the programme. The lead consultant is also actively involved in assisting the contractor with managing the commercial documentation and the drawings necessary for handover. On the Northern Utilities Building, PSA have strengthened their site management team and worked hard on obtaining improved performance from the main contractor and his sub-contractors.

Q29a. In its Memorandum in response to HC286 (the 1991 Report) the Government offered assurances that "the lessons for the quality control of future major construction programmes have been learned" (paragraph 15) from experience on the shiplift. What steps have been taken to ensure that these lessons are disseminated to those likely to be involved in the planning, commissioning and management of such projects?

Q29b. When does the department now expect to make the safety case for the Shiplift?

Q29c. When does the Government expect to be in position to provide further information on the financial settlement relating to the defective shiplift piles, and on the safety case and supporting documentation?

A29a. Notes of guidance, derived from the experience gained from the Trident programme and tailored to be applicable to as wide a range of projects as possible, have been issued within the Department. Included in these guidance notes is specific advice on the application of quality control and arrangements for commissioning together with general guidance on the management and planning of projects.

A29b. Work continues to ensure that the facility is completed and a satisfactory safety case established so that it will be available for the first lift of a nuclear submarine.

A29c. The Government reaffirms its undertaking to provide a report to Parliament when the financial settlement has been concluded, subject to any legal or commercial confidentiality considerations. We are unable to give an indication of the possible timeframe but the settlement is unlikely to be resolved before completion of the final account for the Shiplift contract. The Government also reaffirms its intention to consider the extent to which, subject to any security constraints, the eventual Shiplift safety case and supporting documentation can be made available publicly.

G. AWE

Q30. 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 trade are particularly badly affected?

A30. We still expect to maintain the programme without any increase in overall numbers, though continued recruitment will be necessary to offset natural wastage and to ensure the correct mix of skills.

Against this background, the current vacancies needing to be filled at Aldermaston, Burghfield and Cardiff are as follows:

	Aldermaston	Burghfield	Cardiff
Supervisory and AEC	23	10	0
Specialists	128	11	0
Industrials, craft	5	1	0
Industrials, non-craft	7	0	0

The main areas of recruitment difficulty are with Electrical Design Engineers, Chemical Engineers and Metallurgists.

Q31a. Have there been any further changes, since those of October 1989, in the value of the October 1988 Special Pay Additions (SPAs) for staff at Aldermaston and Burghfield?

Q31b. Have there been any other changes in the pay and allowances of staff at these establishments as a result of the interim management contract?

Q31c. Have the SPAs (or other special allowances if applicable) been extended to all staff at Foulness and Cardiff?

A31a. No.

A31b. No.

A31c. No.

Q32. The Committee has requested a memorandum on the corrosion discovered in the pipework in Building A91, covering the extent and implications of that corrosion and the outcome of the technical investigation referred to in Mr Carlisle's written answer of 3 June 1991 (Official Report Col 127).

A32. The A91 Radioactive Liquid Effluent Treatment Plant building is part of the AWE Capital Works Programme, and is required to remove low level radioactive contamination from waste water discharged from the site.

The facility was handed over to AWE in 1989, on completion of construction and testing. Commissioning using simulant (ie non-radioactive) materials commenced, but was stopped in March 1991 following the discovery of leaking stainless steel pipework and filter vessels. No radioactive material had been introduced into the building.

A Task Force was established to conduct a full investigation into the cause, and possible solutions, to the problem. Technical assistance and expert opinion was sought from AEA Harwell, the Corrosion and Protection Centre Industrial Services of the University of Manchester Institute of Science and Technology, and from the designers of the plant, Babcock Woodall Duckham Ltd (now part of Babcock Contractors Ltd). A detailed inspection of some 40 per cent of the total process plant, pipework and vessels (the Core Plant), together with a visual inspection of the remaining plant (to ensure that the core plant was representative of the complete facility), was undertaken by the National Nuclear Corporation Ltd (NNC) from July to October 1991.

The Task Force concluded that the stainless steel pipes and vessels had suffered severe localised pitting attack caused by a synergistic combination of chloride and microbiological induced effects. The chlorides were present at very low levels due to the chemicals added as part of the treatment process whilst the microbes occurred naturally in the water supply used to fill the plant for testing and commissioning. The NNC inspection revealed only a small portion of the plant was affected, although the localised corrosion was severe.

The stainless steel used in the facility (known as 316L) is that most commonly used for process plants of this type; it was selected following careful consideration by the designer, PSA, and AWE. Corrosion in stainless steel was known to be induced by chlorides, but not at the low concentrations to be used in A91.

Following completion of the investigation, further studies have been initiated to evaluate in full a number of options for the repair of the damage caused, and the changes needed to prevent a recurrence. No decision has yet been made on the option to be adopted, and there is no firm indication available on the likely cost or timescale. The necessary action has been taken to ensure that existing waste treatment facilities can continue to operate effectively and safely, and to support fully the requirements of the Trident programme, until the new facility becomes fully operational.

H. AWE CONTRACTORISATION

Q33. The Committee has requested a report on the progress of the interim management contract between MoD and Hunting BRAE Ltd, to cover (a) the success of the contractor in meeting the agreed objectives, (b) costs so far, including any performance-related payments, (c) the main steps taken by the contractor to improve programme management and the control of manufacturing and support services, (d) health and safety, (e) security issues, and (f) the functioning of the Compliance Office.

A33a. Contract objectives included the provision of senior and experienced staff to manage AWE, in particular to improve manufacturing and site support activities, and the completion of three task force studies covering pay and conditions, long term manufacturing strategy, and management information systems. Accordingly, Hunting-BRAE Ltd have seconded 20 staff to AWE, and have introduced a revised management structure, including Directorates responsible for Operations, Site Engineering, Research & Development, and Strategic Development; the latter managing the three task force studies. All of the studies were completed on schedule, and the recommendations have been submitted for consideration. The Establishment has continued to meet stringent safety and security standards whilst achieving its programme commitments including supporting existing in-service warheads, and the Trident programme.

A33b. From the commencement of the contract in October 1990 to 31 December 1991, total payments of * have been made to Hunting-BRAE. This includes contract milestones payments of * and performance-related awards of * .

A33c. The new Operations Directorate has introduced professional management skills and procedures to all AWE programmes, including clearer lines of responsibility and authority with more modern project management planning and reporting methods. In the Production Directorate, line management responsibilities have been realigned to provide more clearly defined chains of command, whilst the Site Engineering Directorate has introduced multi-disciplinary, functionally based teams, with in-house staff concentrated on core activities where specialists skills are more necessary. Rationalisation and efficiency improvements are expected to flow from these revised arrangements which reflect a more positive industrial culture; early signs are encouraging.

A33d. Safety has continued to attract the highest priority, and the Director Safety remains a member of the AWE Executive Board. Additionally, Hunting-BRAE have introduced a new managerial position charged with reviewing safety performance and proposing future developments.

A33e. Security also has continued to be a high priority, and both physical and personnel aspects have been rigorously maintained. The security organisation and arrangements inherited by Hunting-BRAE have remained unchanged. Good progress has been maintained on a number of security projects.

A33f. The Compliance Directorate has been established and continues to develop its methods and approach whilst providing overall management of the Phase 1 contract. The compliance methodology used for this phase, which included the assessment of milestone achievement, evaluation of performance related payments, and monitoring and oversight of the Task Force studies, will help in the definition of methods and organisation needed for full contractorisation. In preparation for this, the Compliance Directorate responsibilities have included the production of tender documentation, co-ordination of a range of necessary changes, for example, pension arrangements, publication of information sheets, and consultation with the Trades Unions.

Q34. What is the programme (with dates) for proceeding to full contractorisation?

A34. [Answer submitted on 26.2.92].

KEY MILESTONES FOR AWE CONTRACTORISATION

SUMMER 1992	—	Issue of ITT.
SEPTEMBER 1992	—	Return of tenders.
JANUARY/FEBRUARY 1993	—	Selected contractor announced.
	—	Contract placed.
1 APRIL 1993	—	Vesting Day – start of full contractor operation.

Q35a. What steps are being taken to ensure that the research programme at AWE is and will in future be more directly related to the requirements of the customer?

Q35b. Have there been any organisational or other changes within the Department to ensure that the nuclear weapons research programme is subject to closer scrutiny and control?

Q35c. What arrangements are envisaged with regard to the planning, management and monitoring of the nuclear weapons research programme under full contractorisation?

A35. The AWE research programme is currently structured to respond to MoD's requirements in a number of broad areas of work. In order to strengthen management procedures, Hunting-BRAE are implementing a Research Management Plan which will provide detailed, costed and resourced plans for the research programme over the next few years. This will provide customers with a clearer picture of the objectives and ratio nale for the proposed AWE programme to fulfil MoD's requirements.

The Phase 2 contract will bring the customer-supplier arrangements onto a taut contractual footing. In common with the rest of the AWE programme, research will be authorised as a number of discrete well defined packages. These will set down customer objectives, define the programme required, and specify milestones, deliverables, management arrangements, reporting and reviewing, and other contractual requirements.

3. Supplementary Notes submitted by the Ministry of Defence following the oral evidence on 5 March. (10.3.92)

1. *Q2014.* Mr Hawtin offered to provide the Committee with an analysis of contingency allocations within the total Trident estimate as announced by the Secretary of State for Defence on 4 February. The analysis, which represents the contingency allocation as a percentage of the balance of the estimate as yet unspent, is as follows:

Submarine	6.4%
Strategic Weapon System	2.6%
Tactical Weapon System	0.7%
Shore Construction (excluding Rosyth)	10.4%
Rosyth Works & Functional Machinery	11.9%
Warhead/Miscellaneous	1.6%
Unallocated Contingency	7.5%
Total Contingency	12.0%

2. *Q2025.* The Committee requested details of US Trident programme contracts awarded to UK companies. I attach a table listing all such contracts with a value in excess of £0.5M which supplements the material provided in the course of the Committee's 1987/88 enquiry (HC 422, page 20, A13).

Company Contracts (£)	*Nature of Work*	*Total Value of*
Babcock Energy Ltd	Motor Chocks	6,594,339
Ferranti International	Electronic Components	3,301,928
Flexible Technology Ltd	Printed Wiring Strips	2,069,000
GEC Mechanical Handling Ltd	Upenders/Loading Tubes	3,845,648
Harker & Sons (Engineers) Ltd	Interfaces/Rounding Rings	1,801,283
Hughes Micro Electronics Ltd	EA & IMUE Modules	30,444,047
IDM Electronics Ltd	Slip Ring Assemblies	5,612,912
Industrial Precision Castings Ltd	Castings	813,290
Marconi	Electronic Hybrids	715,095
Pilkington PE Ltd	Optical Assemblies	1,340,438
Semelab Manufacturing Ltd	Transistors/Semi Conductors	4,315,063
Stop Choc Ltd	Shock Mounts	2,129,294
Vickers Shipbuilding and Engineering Ltd	Missile Service Unit	1,616,749

Note:
Contract values have been calculated using the current Trident programme Exchange Rate of £1 = $1.59.

3. *Q2073.* The Committee sought an assessment of the additional cost involved at the time of parallel running of both Polaris and Trident, and asked specifically about the estimate given in evidence to the Committee in 1988 that the peak requirement for the submarine service might be around 800 men. Our current estimate is that the submarine service will have a peak requirement for about 750 additional men in 1993 to cover the Polaris/Trident overlap. The effect of the anticipated "bulge" has been somewhat ameliorated by recent changes in the submarine programme, so that the overall submarine service numbers have been falling since mid 1991. At RNAD Coulport, there will be no significant overall increase in civilian staff numbers during the overlap period. The increase due to Trident will be offset by the phase out of Polaris which will gather momentum from the mid-1990s. Any increases in other elements of running costs during the period of parallel running of Polaris and Trident are not expected to be significant.

4. *Q2093ff.* The Committee sought confirmation that no further payments were due to the Ministry of Defence in respect of the Devonshire Dock Hall. We can confirm that this is the case.

5. *Q2103.* Officials undertook to give an approximate indication of expenditure on the construction of SSBN 08 under long lead funding arrangements as a percentage of the estimated price. Since such a figure, if published, could compromise the conduct of negotiations for the SSBN 08 contract, the Committee may find it helpful to note that expenditure on SSBN 08 to the end of December 1991 (as noted in the Government's response to Question 6) represents 24 per cent of the contract value of SSBN 07. The Committee may also wish to note that expenditure on SSBN 08 to the end of January 1992 now totals £144M.

4. Letter from the Private Secretary to the Secretary of State for Defence to the Clerk of the Committee (3.3.92)

In your letter of 14 February 1992, you asked whether it would be possible to declassify VANGUARD's in service date and the cost of the Barrow Exit dredging operation.

Taking VANGUARD first, the precise date of her entry into service remains classified. We have, however, tried to be as forthcoming as possible in the unclassified answer to Question 11(a) by giving a broad indication of the timing. I can certainly confirm that there has been no slippage to VANGUARD's planned ISD.

In the case of the Barrow dredging contract, the figure given in answer to Question 26 is commercial in confidence and should not therefore be made public. We would, however, be content for a reference to be made to an assessed cost of "some £40M" on an unclassified basis.

5. Letter from the Private Secretary to the Secretary of State for Defence to the Clerk of the Committee (19.12.91)

Thank you for your letter of 6 November, in paragraph 4 of which you refer to claims that there is a ban on the Royal Navy's nuclear powered submarines visiting foreign ports.

We have already explained to the Committee our approach to nuclear submarine safety and the way in which we have dealt with the matter of the technical defect discovered in HMS WARSPITE. We have said publicly on a number of occasions that, following this discovery, a programme of inspections of all the Royal Navy's nuclear powered submarines was set in hand as a prudent precautionary measure because of the *potential* safety implications of the defect. We have also made clear that our nuclear submarines, including those of the Polaris force, continue to operate,and are maintained, in accordance with rigorous safety standards. Nuclear reactor operation is permitted only when the MoD's technical and safety experts judge that it is safe to do so and when that judgment has been endorsed by the Nuclear Powered Warships Safety Committee (NPWSC), which provides the MoD with independent expert safety advice on nuclear submarines.

Members of the Committee may be assured that there is no ban on visits buy our nuclear submarines to foreign ports, although the MoD has imposed some operational restrictions which have affected port visits generally. These are described below.

Following the discovery of WARSPITE's defect and in the light of the requirements of the subsequent programme of technical inspections (which had itself affected deployment plans), the forward programme of operations (including port visits) for our nuclear powered hunter-killer fleet submarines (SSNs) was reviewed by Ministers early last year. It was decided that the operation of any submarine (whether at its home port, at sea, or during visits to other ports) should have the specific approval of the MoD's technical and safety experts, and the endorsement of the NPWSC. Only visits judged to be operationally necessary have taken place. No port visit has been disallowed on safety grounds.

A number of SSN visits to ports overseas (in the US, Norway, Bermuda and Gibraltar) have taken place since the submarine programme was reviewed. Application for diplomatic clearance for visits to foreign ports has been made by MoD officials in the usual way through our Embassies in the countries concerned.

The operation of the Royal Navy's Polaris submarines is subject to the same clearance requirements as apply to SSNs. As you will appreciate, however, because of the covert and continuous nature of their deployments, our deterrent submarines do not anyway make port visits as a matter of routine (indeed, the last time one called at a foreign port was in 1987, when HMS REPULSE visited Port Canaveral in the United States).

6. Letter from the Private Secretary to the Secretary of State for Defence to the Clerk of the Committee (9.12.91)

During its past Inquiries into the progress of the Trident programme, the Committee has taken a close interest in the implications for the United Kingdom Trident force of the refit programme for the Resolution class Polaris missile submarines.

In the light of this, I am writing to let you know that my Secretary of State has decided that HMS REVENGE should be paid off at the end of her present commission, and that a further refit is not required.

If HMS REVENGE had been refitted, the submarine would have been in operational service for only a short period before the Polaris force was withdrawn—the exercise would not therefore have been cost effective.

This decision reflects our confidence that the Trident system will deploy on time in mid-1990s, and that continuous deterrent patrols will be maintained throughout the transition from Polaris to Trident and beyond.

7. Letter from the Assistant Parliamentary Liaison Officer at the Ministry of Defence to the Clerk of the Committee (25.6.91)

In its first tranche of written evidence on the Trident programme submitted to the Committee on 27 February, the Department noted (Answer 31A) the Magnetic Treatment Facility (MTF) at Faslane amongst those Trident-related works programmes which were either experiencing delays or under review. At the subsequent oral evidence session on 6 March, officials explained (Q126) that the Department was awaiting the results of a design evaluation study to review the facility's specification, which would enable us to decide on the best way forward.

In view of their interest in this facility, the Committee will wish to know that the design evaluation study has highlighted a considerable increase in the expected cost of the MTF (and a likely delay of 18 months to its in service date). In view of these findings, and the results of further studies into lower cost and operationally adequate alternative methods of controlling magnetic signatures, the Department has concluded that to press ahead with this facility would not represent the most cost-effective use of resources. Ministers have decided therefore that the MTF design and build contract should be cancelled, and the prime contractor, Dowty Defence and Air Systems Ltd, has been informed of this decision. Mr Carlisle will be announcing this tomorrow afternoon by way of a written answer; I attach the text.

Our efforts will now be focused on determining the best alternative method of treatment for the Vanguard class and other RN submarines. This decision will not effect the programme for the deployment of the Trident submarines.

MAGNETIC TREATMENT FACILITY—ANNOUNCEMENT

We have decided not to proceed with the contract with Dowty Defence and Air Systems Limited for the design and construction of a Magnetic Treatment Facility at Faslane. Recent design studies suggest that a more cost-effective and less environmentally obtrusive means of meeting the requirement should be available. The decision to cancel the contract in no way reflects on the standard of performance of the company or its subcontractors. It will not affect the programme for the deployment of the Trident submarine.

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