

DEFENCE COMMITTEE

Third Report

**THE PROGRESS OF THE
TRIDENT PROGRAMME**

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

*Ordered by The House of Commons to be printed
11th May 1988*

LONDON
HER MAJESTY'S STATIONERY OFFICE
£7.60 net

DEFENCE COMMITTEE

Third Report

**THE PROGRESS OF THE
TRIDENT PROGRAMME**

**Report and Appendices,
together with the
Proceedings of the Committee,
Minutes of Evidence and
Memoranda**

*Ordered by The House of Commons to be printed
11th May 1988*

LONDON

HER MAJESTY'S STATIONERY OFFICE

£7.60 net

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 its evidence and any other documents relating to matters of common interest; and
- (d) to meet concurrently with any other such Committee for the purposes 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 Wednesday 9 December 1987.

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

TABLE OF CONTENTS

	<i>Page</i>
REPORT	v
Appendix A: List of relevant documents	xxxv
Appendix B: List of abbreviations and terms	xxxvi
Proceedings of the Committee	xxxvii
Minutes of Evidence taken before the Committee on 30 March 1988	1
MEMORANDA	
Report by the Secretary of State for Defence, 21 January 1988	15
Memorandum by the Ministry of Defence, 21 March 1988	17
Memorandum by the Ministry of Defence, 11 April 1988	27
Memorandum by the Ministry of Defence, 19 April 1988	33
Memorandum by the Ministry of Defence, 10 May 1988	37

THIRD REPORT

The Defence Committee has agreed to the following Report:—

THE PROGRESS OF THE TRIDENT PROGRAMME

PART I—INTRODUCTION

1. This is the fifth consecutive year that the Defence Committee has examined the progress of the *Trident* programme. A list of earlier Reports, and other relevant documents, appears in Appendix A. A glossary of abbreviations and terms appears in Appendix B.

2. As a result of a recommendation by the Defence Committee in 1985¹, the Secretary of State has since 1986 provided an annual report on the project, covering cost, composition, timing, the proportions of UK and US expenditure, value and number of contracts with UK firms, employment opportunities and jobs created.

3. This year's report was submitted by the Secretary of State on 21 January 1988. We have followed this up by taking detailed oral and written evidence from the Ministry of Defence. The great majority of this evidence was precise and helpful. As in previous years, a proportion has been withheld from publication for reasons of national security. We have examined the Ministry's requests for deletions and have found them justified.

4. We do not consider that the evidence given by the MoD to our predecessors on the development and production of the sonar suite, or on the construction works at the Atomic Weapons Establishment (AWE) Aldermaston, reached acceptable standards of accuracy and frankness. We examine these subjects in paragraphs 42 to 47 and 61 to 90 of this Report.

5. We intend to keep the *Trident* programme under review as it moves into a period of peak activity. We also intend to maintain our interest in the United Kingdom's overall nuclear capability, and *Trident's* place within it. We have followed the practice of the previous Committee in not-re-examining the arguments for and against procuring *Trident* as a replacement for *Polaris*. Our purpose here is to give an assessment of the present state of the programme.

Conduct of the inquiry

6. The oral and written evidence is listed on p. iii. In addition, we made the following visits, to see for ourselves the progress being made, and to be briefed on various aspects of the programme:

- to Vickers Shipbuilding and Engineering Ltd at Barrow, to see progress in the building of *Trident* submarines.
- to the Clyde Submarine Base, Faslane, where we also visited the *Polaris* submarine HMS REVENGE.
- to the Royal Naval Armament Depot, Coulport.
- to AWE Aldermaston, where we saw the new construction in progress and observed some of the processes carried out there.

We would like to express our thanks to those who briefed us and who helped to make these visits so useful and informative.

7. We have been greatly helped by the work of the National Audit Office in the Comptroller and Auditor General's report on *Control and Management of the Trident Programme* (HC 27 of Session 1986-87).²

¹HC 479 of Session 1985-86, paragraph 6.

²Referred to in this Report as "C&AG's 1987 Report".

PART II—THE NEW ESTIMATE

8. In January 1988 the Secretary of State for Defence announced that his revised estimate for the cost of the *Trident* programme was £9,043 million at 1987-88 prices,³ covering a period of expenditure from 1980 to 2000. This is the third successive year in which the estimate for *Trident* has fallen. The latest estimate is some 17 per cent lower than the original estimate of November 1981,⁴ which was £10,850 million at present prices.⁵ Table I shows the successive estimates since the announcement in March 1982 of the decision to purchase *Trident D-5*.

TABLE I

Changes in the total estimated cost of the Trident programme, 1981-88

	<i>At Prices then Current</i>	<i>Approximate UK Spend</i>	<i>At Constant 1987-88 Prices</i>
	£ million	£ million	£ million
November 1981	7,520 ⁶	4,207	10,850
February 1983	6,984 ⁷	4,200 ⁸	10,039
March 1984	8,729 ⁹	4,800 ¹⁰	10,039
January 1985	9,285 ¹¹	5,142 ¹²	10,096
January 1986	9,869 ¹³	5,392 ¹⁴	9,819
January 1987	9,265 ¹⁵	5,786 ¹⁶	9,335
January 1988	9,043 ¹⁷	5,814 ¹⁸	9,043

9. Table II shows the two main reasons for the reduced estimate.

First, the decision, taken in 1982, to refurbish the missiles at the US facility at King's Bay, Georgia, rather than at the Royal Naval Armaments Depot (RNAD) Coulport. This saved £770 million.

Second, there has been a substantial reduction in the estimates of spend in the United States on the British programme (well over £1.3 billion) only slightly blunted by an increase of over £300 million in the UK spend. This is the result of refinement of US estimates, the move of some work (for example the fabrication of remaining missile tubes) to the UK and exchange rate changes.

³Evidence, p16.

⁴The normal base-line for assessing the progress of the *Trident* programme is the decision to opt for the *D-5* version of the missile. The first cost estimates for *D-5* are dated November 1981, although the decision was not announced to Parliament until March 1982.

⁵*Major Project Statement 1987*. The hybrid estimate, one that expresses all sunk costs at the price level and exchange rate at which the expenditure occurred, is £8,948 million. Evidence, p27, A7.

⁶At September 1981 prices, at an exchange rate of £1=\$1.78.

⁷At September 1981 prices, at an exchange rate of £1=\$1.78

⁸HC 179 of Session 1984-85, page x.

⁹At average 1983-84 prices, at an exchange rate of £1=\$1.53. The March 1984 figure was the February 1983 figure revalorised, but using US inflation factors which later proved to have been overstated.

¹⁰*Statement on the Defence Estimates 1984*, Cmnd 9227-I, paragraph 405.

¹¹At average 1984-85 prices, at an exchange rate of £1=\$1.38. See HC 479 of Session 1984-85, page 1.

¹²HC 179 of Session 1984-85, p.x.

¹³At average 1985-86 prices, at an exchange rate of £1=\$1.28. See HC 399 of Session 1985-86, page 162.

¹⁴See HC 356 of Session 1986-87, pxvii.

¹⁵At average 1986-87 prices, at an exchange rate of £1=\$1.50. See HC 356 of Session 1986-87, p vi.

¹⁶At average 1986-87 prices, at an exchange rate of £1=\$1.50. See HC 356 of Session 1986-87, p xvii.

¹⁷Evidence, p16.

¹⁸*ibid*.

TABLE II¹⁹
Changes between 1981 Estimate and Current Estimate

	<i>Estimated Cost £M</i>	<i>Expenditure in</i>	
		<i>US £M</i>	<i>UK £M</i>
November 1981 Estimate (Sept 1981 prices, £1=\$1.78)	7,520	3,313 (44%)	4,207 (56%)
Inflation	+2,890	+1,141	+1,749
Exchange Rate variations	+440	+440	—
King's Bay Changes	-770	-304	-465
Real Changes	-1,038	-1,361	+323
Current Estimate (1987-88 Prices, £1=\$1.62)	9,043	3,229 (36%)	5,814 (64%)

10. Table III shows the real changes in the different components of the programme. It demonstrates the MoD's success in reducing the estimated cost of the *Trident* submarines and the benefit gained from savings in the US missile programme. However, it also indicates that there have been significant increases in the estimates for shore construction and the general category of "warhead, miscellaneous and unallocated contingency".

TABLE III²⁰
Real Cost Changes: 1981-88, at 1987-88 prices and £1=\$1.62
Note: Figures rounded to nearest £1 million, hence any apparent imbalances

	<i>Estimated Cost £M</i>	<i>Expenditure in</i>	
		<i>US £M</i>	<i>UK £M</i>
Submarines (less weapon systems equipment)	-868	-106	-762
Missiles	-591	-576	-16
Strategic Weapon Systems (SWS) equipment	-337	-359	+22
Tactical Weapon Systems (TWS)	+225	+3	+222
Shore Construction	+337	—	+337
Warhead, miscellaneous and unallocated contingency	+197	-323	+520
Total	-1,038	-1,361	+323

¹⁹Based on Evidence, p17, A1.

²⁰Evidence, p17, A1. Note: this Table excludes the savings of £770 million resulting from the decision to refurbish missiles at King's Bay.

11. Because the original estimates for *Trident* were made at a time when sterling was strong against the dollar, there has been only a slight increase in cost as a result of exchange rate factors since November 1981. This increase was much greater in previous years when sterling was substantially weaker. **The strengthening has been one of the most important factors in bringing the estimate down over the past three years. Since the most recent estimate was made sterling has strengthened further against the dollar, to the point where it is now at a level comparable with that of 1981.**²¹ We note that the MoD now buys US dollars forward "for at least the Estimates year's needs" to reduce the effect of rapid fluctuations²². The impact of possible future variations in the exchange rate is illustrated in Table IV.

		1981 Estimate less King's Bay (dollar content \$7,436m)			Current Estimate (dollar content \$5,231m)		
		US	UK	Total	US	UK	Total
i.	\$1—£1	7,436 (58%)	5,491 (42%)	12,927	5,231 (47%)	5,814 (53%)	11,045
ii.	\$1.25—£1	5,949 (52%)	5,491 (48%)	11,440	4,185 (42%)	5,814 (58%)	9,999
iii.	\$1.62—£1	4,590 (46%)	5,491 (54%)	10,081	3,229 (36%)	5,814 (64%)	9,043
iv.	\$1.75—£1	4,249 (44%)	5,491 (56%)	9,740	2,989 (34%)	5,814 (66%)	8,803
v.	\$2—£1	3,718 (40%)	5,491 (60%)	9,209	2,615 (31%)	5,814 (69%)	8,429

12. The strengthening pound has resulted in an increased proportion of spend in the UK. In addition, some work originally intended for the US has been shifted to UK contractors. As a result of these two factors, the ratio of UK to US spend is now more favourable to the UK than it has been at any time since the original programme, based on the *C-4* version of *Trident*, was announced in 1980. This is demonstrated in Table V.

Date	Exchange Rate	Price Base	US Spend		UK Spend		Total UK & US £m
			£m	%	£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

²¹The impact of variations in the exchange rate on the *Trident* estimate is shown in C&AG's 1987 Report, Appendix 2.

²²Q.58.

13. **As the programme develops the cost estimates will tend to become firmer.** By 31 March 1987, £1,106 million at present prices had been spent on the *Trident* programme.²³ In May 1987 the Government estimated that the value of the current *Trident* commitment was about £3,000 million.²⁴ By the end of 1987, £1,385 million had been spent, with £3,500 million in total committed.²⁵ Of this, £379 million has been spent in the US, with a total commitment there of £800 million.²⁶ The MoD estimate that, by the end of the 1987/88 financial year a further £175 million will have been spent.²⁷ By the end of 1989-90 some £3,426 million in total will have been spent, including £898 million in the US.²⁸ **Thus expenditure during the coming two years will be £1,866 million, or on average £77.75 million a month.**

14. **The programme continues to include a substantial contingency provision—£1,251 million or some 20 per cent of the remaining expenditure.**²⁹ Of this almost half—£595 million—is unallocated.³⁰ The allocated contingency varies considerably; particularly high allocations have been made to the construction elements of the programme. **In general, the contingency element for the construction programmes has been set at higher levels than for production programmes. We consider this to be realistic.** Allocated contingency levels for production programmes have been around 10 per cent, and are reassessed on the basis of the amount still to be spent on that particular programme.³¹

15. As far as the progress of the *Trident* programme is concerned, the conclusion of the Comptroller and Auditor General in July 1987 is still valid:

... "the bulk of the expenditure still has to be incurred, and the sterling cost of the US part of the programme is vulnerable to any future unfavourable movement in exchange rates. The US missile development programme is significantly more advanced than the United Kingdom (UK) *Trident* programme and there is no indication of any US problems which would jeopardise the UK programme. However, some sources of risk to the UK programme remain, particularly in the building works and AWRE capital programmes and also as a result of shortages of specialist staff in MoD for weapon system software development and at AWRE."³²

²³ *Major Project Statement 1987*, Table I (not reported). The sum was equivalent to £1,011 million at outturn prices.

²⁴ *Official Report*, 5 May 1987, col 565.

²⁵ Evidence, p18, A2.

²⁶ *ibid.*, A3.

²⁷ *ibid.*, A6.

²⁸ Evidence, p24, A36.

²⁹ Evidence, p19, A9. That is, on the basis of remaining expenditure *excluding* contingency.

³⁰ *ibid.*, A10.

³¹ Q64.

³² C&AG's 1987 Report, paragraph 4.

PART III—TRIDENT IN THE CONTEXT OF BRITISH NUCLEAR CAPABILITY

Attribution of expenditure

16. The *Trident* missiles will be carried in nuclear-powered submarines. They will also form one component of the United Kingdom's nuclear forces. The cost of *Trident* will thus represent only part of the cost of procuring, operating and maintaining modern submarines, and only part of the cost of manufacturing and maintaining nuclear weapons. **The question thus arises as to what proportion of more general expenditure is to be attributed to the *Trident* programme.**

17. The MoD makes detailed assessments of the extent to which expenditure on related projects is needed because of *Trident*. However detailed those assessments may be, there will inevitably be an element of judgment in the process. The attribution may also not be wholly realistic, in that it is based on the premise that *Trident* will be procured. Whether certain other projects would be cost-effective *without* *Trident* is another matter.

18. **We must stress, however, that the *Trident* costing is more comprehensive than those for MoD's conventional projects.** It includes the cost of the weapon platform and armaments and associated training, support and refitting facilities, MoD's estimated additional resource costs and an element for those of the Property Services Agency (PSA). It does not include the cost of MoD's existing staff resources, or running costs after entry into service. In addition, there are some areas of expenditure associated with *Trident* which are not included in the estimate and which are discussed below.³³

19. On the other hand, the *Trident* programme benefits from spending on the PWR2 nuclear reactor which will be used for the next generation of SSNs, for which it was designed, as well as for *Trident* SSBNs, and from expenditure on the extremely low frequency (ELF) communications system which can be used by all RN submarines.

20. Table VI shows the attribution to the *Trident* programme of the major shore construction projects in Scotland.

	<i>Related</i>	<i>Attributable</i>	<i>Percentage Attributable</i>
Coulport	£222m	£222m	100%
Faslane	£267m	£90m	34%
Clyde Submarine Base: External Roads and Utilities	£40m	£38m	95%
Rosyth	£214m	£51m	24%
Total	£743m	£401m ³⁴	54%

³³C&AG's 1987 Report, paragraph 1.6.

³⁴There are also costs elsewhere of £10 million, of which £9 million is attributable to *Trident*, giving a total attributable works cost of £410 million. The MoD's evidence notes that "to the figure of £410 million must be added contingencies (£150 million and PSA resource costs £94 million) and £3 million price variations on sunk costs in order to arrive at a total of £657 million (non-hybrid) which reflects the figure of 7 per cent included in the breakdown of *Trident* costs made available to the House by the Secretary of State on 21 January this year" (Evidence, p 21, A21).

21. The proportion of works costs at Faslane and Rosyth attributed to *Trident* has declined markedly since the previous Committee's 1985 review. This followed an examination by the MoD in 1985 of the attribution of Trident costs. The review covered 110 major works projects and resulted in 16 attributions being changed: 11 were reduced and five increased.³⁵ The overall proportion attributed to *Trident* has declined from 65 per cent in 1985 to 54 per cent in 1988. The net changes at Faslane/Coulport and Rosyth are shown in Table VII.

TABLE VII³⁶
Changes in Attributable and Non-Attributable Costs of Shore Construction Projects

	1985			1988		
	Attributable	Trident-Related	Percentage Attributable	Attributable	Trident-Related	Percentage Attributable
Faslane/Coulport	300	400	75%	350	529	66%
Rosyth	90	200	45%	51	214	24%
Totals	390	600	65%	401	743	54%

22. The same pattern is evident with the construction programme at Aldermaston which we discuss in paragraphs 61 and 62 below. In 1985, out of a cost then estimated at £321 million, £24.5 million was attributed to *Trident*.³⁷ Not long thereafter the estimate was raised to between £836 million and £1,069 million while the amount attributable to Trident rose only to £50 million.³⁸

23. Costs associated with the continued operation of the *Polaris* fleet will continue until well into the next decade, although these costs will eventually decline as the old SSBNs are decommissioned. As can be seen from Table VIII, almost £2 billion has been spent on the operation and maintenance of *Polaris* so far in this decade, substantially more than on *Trident*. Expenditure on *Polaris* peaked early in the decade, with the introduction of the new *Chevaline* front-end. It has recently been rising again significantly. This may be partly attributable to the additional maintenance costs associated with the ageing *Polaris* fleet; but MoD expect expenditure to fall below £300 million in 1988-89.

TABLE VIII
Expenditure on Strategic Nuclear Forces, 1980-88³⁹

Figures expressed in £ million at the price levels of the original Estimates for each financial years.

	Defence Budget	Strategic Nuclear Forces			constant 87-88 prices		Total
		<i>current prices</i>	Total	Polaris % age of total	Trident % age of total		
	Polaris	Trident					
1980-81	10,785	162	3	165	270 (98%)	5 (2%)	275
1981-82	12,274	238	31	269	369 (88%)	48 (12%)	417
1982-83	14,091	256	71	327	339 (78%)	94 (22%)	433
1983-84	15,973	233	95	328	275 (71%)	112 (29%)	387
1984-85	17,033	219	165	384	232 (57%)	175 (43%)	407
1985-86	18,059	241	268	509	253 (47%)	281 (53%)	534
1986-87	18,479	281	377	658	291 (43%)	391 (57%)	682
1987-88	18,782	332	550(e)	882	332 (38%)	550(e) (62%)	882

³⁵A list of the projects changed appears in Evidence, p21, A22.

³⁶Source: HC 479 of Session 1984-85, paragraph 9 and Qq 1833-34, 1838, 1843-44; Evidence, p21, A21.

³⁷HC 479 of Session 1984-85, paragraph 9.

³⁸Evidence, p23, A30.

³⁹Statement on the Defence Estimates 1986, Cmnd 9763-II, Table 2.5, and Statement on the Defence Estimates 1987, Cm 101-II, Table 2.3.

24. The amounts contained in Statements on the Defence Estimates (SDE) under *Strategic Nuclear Forces* do not give the total costs of remaining a nuclear power. The item *Other Research and Development* in the SDE is distinct from research and development on air, land and sea systems and covers some research and development on strategic nuclear forces. It also covers expenditure on the management of the whole research and development effort in MoD, work undertaken using MoD facilities and personnel for other government departments, and also work on tactical nuclear weapons. In 1984–85 just under 10 per cent of *Other Research and Development* was attributable to *Trident* and it was no higher in 1986–87.⁴⁰ The costs of the eleven nuclear tests conducted by the UK since 1980, the bulk of which are *Trident*-related, are included under Class 1, Vote 2 of the Supply Estimates.⁴¹ The capital works projects at Aldermaston and Burghfield not attributed to *Trident* are found in the *Statement on the Defence Estimates 1987, Vol II*, under Table 2.4 on page 11, New Work Gross Total (PSA Building and Works) and Table 3.3 on page 17, Intramural R&D Capital Plant and Equipment (AWE Capital Equipment).⁴²

⁴⁰HC 356 of Session 1986–87, Table 2.

⁴¹Evidence, p22, A29.

⁴²Evidence, *ibid.*, A25.

PART IV—COMPOSITION OF THE PROGRAMME

GENERAL

25. There have been substantial changes in the composition of the programme since November 1981. In particular, there have been significant reductions in the proportions accounted for by submarines, missiles and the equipment for the missiles. In the same period, the proportions of expenditure devoted to the tactical weapon system and to shore construction have doubled. There has also been an increase in the “warhead, miscellaneous and unallocated contingency” category. In the paragraphs below we examine the individual elements of the programme. Table IX below summarises the changes. Table X on page xiv shows the figures in greater detail.

TABLE IX				
<i>Changes in the Composition of the Trident Programme Estimates 1981-88</i>				
	<i>Nov 1981</i>	<i>Nov 1981 Less King's Bay</i>	<i>Jan 1987</i>	<i>Jan 1988</i>
	%	%	%	%
Submarines	35	37	31	33
SWS Missiles	18	17	12	12
SWS Equipment	13	15	13	12
Tactical weapon system	4	4	8	8
Shore construction	8	3	7	7
Warhead, miscellaneous and unallocated contingency	23	24	30	29

Note: Figures do not add to 100% due to rounding.

	<i>November 1981 Estimate</i> <i>September 1981 prices</i> <i>£1=\$1.78</i>			<i>1981 Estimate less</i> <i>King's Bay Average</i> <i>86/87 prices, £1=\$1.50</i>		
	<i>US</i>	<i>UK</i>	<i>Total</i>	<i>US</i>	<i>UK</i>	<i>Total</i>
	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>
Submarines	267	2,333	2,600	412	3,242	3,653
SWS Missiles	1,275	44	1,319	1,675	31	1,705
SWS Equipment	918	74	992	1,369	97	1,466
Tactical weapon system	—	326	326	—	450	450
Shore construction	—	579	579	—	311	311
Warhead, miscellaneous and unallocated contingency	853	851	1,704	1,348	1,071	2,419
	3,313	4,207	7,520	4,803	5,200	10,003
	<i>January 1987 Estimate</i> <i>Average 86/87 prices,</i> <i>£1=\$1.50</i>			<i>January 1988 Estimate</i> <i>Average 87/88 prices,</i> <i>£1=\$1.62</i>		
	<i>US</i>	<i>UK</i>	<i>Total</i>	<i>US</i>	<i>UK</i>	<i>Total</i>
	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>
Submarines	313	2,536	2,849	290	2,682	2,972
SWS Missiles	1,056	14	1,070	1,035	16	1,051
SWS Equipment	1,029	144	1,173	957	123	1,080
Tactical weapon system	2	726	728	3	690	693
Shore construction	—	671	671	—	657	657
Warhead, miscellaneous and unallocated contingency	1,078	1,696	2,774	944	1,646	2,590
	3,479	5,786	9,265	3,229	5,814	9,043
<i>Note: Some figures do not sum to totals as a result of rounding to nearest £ million.</i>						

SUBMARINES

26. **The original cost estimates for the submarines have been reduced substantially.** The savings of £803 million achieved by 1987 were equivalent to 22 per cent of the 1981 estimate and reflected a re-assessment of build costs (13%) and a reduced contingency allowance (5%).⁴⁴ The current contingency allowance of £208 million or only 7 per cent can be taken to reflect confidence in this aspect of the total programme.

27. In addition, the decision to manufacture the missile tubes in the UK rather than in the US for the second, third and fourth submarines has reduced the dollar content of the SSBN programme substantially.⁴⁵

28. The target price contract for the construction of SSBN 05, HMS VANGUARD, and the completion of First of Class work was let to VSEL in April 1986 at an estimated cost of £650 million, of which £460 million was for the submarine. This was itself £45 million below VSEL's initial tender. This reduction was the result partly of competition between the two potential purchasers of the VSEL yard at Barrow, and partly of the improved productivity at the yard.⁴⁶

⁴³Based on C&AG's 1987 Report, Appendix 1; Evidence, p16; and Evidence, p17, A1.

⁴⁴C&AG's 1987 Report, paragraph 3.4.

⁴⁵This is described in our 1987 Report, HC 356 of Session 1986-87, paragraphs 15, 16.

⁴⁶C&AG's 1987 Report, paragraph 3.4; Evidence, Q59. The companies were VSEL plc and Trafalgar House.

29. The contract for the second submarine—HMS VICTORIOUS—was awarded in October 1987. The cost of VICTORIOUS is put at £425 million as against £460 million for HMS VANGUARD. The lower estimate is the result of lessons learnt during the construction of VANGUARD, which are expected to reduce by 12 per cent the man hours required for VICTORIOUS. Although VSEL is in a monopoly position, the negotiations on the VICTORIOUS contract have been described by the Chief of Defence Procurement as “tough”.⁴⁷

30. The contract includes a normal break clause limiting MoD’s liabilities in the event of cancellation to 100 per cent of contract value. With VANGUARD there was an exceptional break clause provision of 125 per cent, which was reduced to 100 per cent when the contract for the second boat, VICTORIOUS, was placed.⁴⁸

31. An invitation to tender for SSBN 07 was issued to VSEL in March 1988.⁴⁹ We expect that the order for SSBN 08 will be placed in 1990. The names of the third and fourth boats have not yet been announced.

32. The contract price for the SSBNs includes the nuclear propulsion system, the PWR2, which VSEL will purchase from Rolls Royce and Associates Ltd. The development programme for the PWR2 began in 1978. It was originally intended for the next generation of SSNs, which are now due to enter service after 1995. In 1981 it was decided to use the PWR2 for the *Trident* SSBNs. We have been given the development cost of the PWR2, on a classified basis. None of this cost will be attributed to the *Trident* programme as the plant was already under development for future classes of submarine. The costs of modifying PWR2 for *Trident* submarines, and of reactor cores purchased by MoD from Rolls Royce and Associates for installation by VSEL, will, however, be borne on the *Trident* programme.⁵⁰

33. In October 1987 MoD officially accepted the purpose-built shore test rig for PWR2 at HMS VULCAN in Dounreay. It will now undergo tests to simulate the full range of activities of a nuclear submarine. When accepting the PWR2 for MoD in October, the Minister of State for Defence Procurement complimented Rolls Royce and Associates Ltd for completing the job ahead of schedule and within budget. He noted that the new reactor would be twice as powerful as the PWR1.⁵¹ The cost of the propulsion unit (comprising the Nuclear Steam Raising Plant and secondary Propulsion Machinery) is some £70 million for each SSBN.⁵²

34. By December 1987, £312 million had already been spent on SSBN 05, with £68 million, £26 million and £37 million on SSBN 06, 07 and 08 respectively. The expenditure on SSBN 08 reflects the procurement of construction support spares for the whole of the VANGUARD class. Items procured against this heading will ultimately be absorbed into the class build programme.⁵³

STRATEGIC WEAPON SYSTEM

General

35. **There appear to be few concerns connected with the provision of the strategic weapon system by the United States.** The system includes not only the missiles but also the sub-systems for navigation, fire control, guidance and launching. Almost all the cost will be incurred in the US. There has been a substantial reduction in the estimate as a result of “better estimating, re-allocation of some of the work to the support area and reduced contingencies as confidence in estimates has increased”.⁵⁴ The Chief Strategic Systems Executive told us that the US *Trident* missile tests had shown a “remarkably low” failure rate.⁵⁵ He also understood that the reason for a recent failure had been identified and that a recurrence could be prevented. Our witnesses were satisfied with the results of the US *Trident* missile testing programme.

⁴⁷HC 189-I of Session 1987-88, Q.612.

⁴⁸MoD News Release 6 October 1987; See also HC 189-I of Session 1987-88, p.vii.

⁴⁹*Official Report*, 14 July 1987, col. 964; see also 2 July 1987, col. 162.

⁵⁰C&AG’s 1987 Report, paragraph 3.5.

⁵¹C&AG’s 1987 Report, paragraph 3.5. *The Guardian*, 3 October 1987; *The Times*, 3 October 1987; *Jane’s Defence Weekly*, 24 October 1987.

⁵²Evidence, p20, A16.

⁵³Evidence, p19, A8.

⁵⁴C&AG’s 1987 Report, paragraph 3.9.

⁵⁵Evidence, Q.55.

Arms Control aspects

36. The possible effect of any future arms control agreement between the United States and the Soviet Union upon the continued availability of UK *Trident* missiles has been widely commented on. The Prime Minister has sought and received assurances from the United States that the supply of *Trident* missiles to the UK will in no way be affected by any future arms control agreement. At present we see no cause for concern on this point.⁵⁶

The UK element

37. **Although only 5 per cent of expenditure on the Strategic Weapon System is to be made in the UK, this is the area where potentially serious problems have arisen.** According to the Comptroller and Auditor General:

“... proving the effectiveness of the system for UK purposes is dependent on the production in the UK of software for targetting, modelling and effectiveness assessment. DGSWS⁵⁷ currently has a shortage of scientific staff to carry out these tasks and has had difficulty in recruiting such specialists since 1982. The position is not yet critical, but could become so, with a potential risk to assurance of the effectiveness of the UK system. Software work is being contracted out to complete essential tasks”.⁵⁸

38. **These problems give cause for concern.** As in the case of recruitment and retention problems at AWE Aldermaston, which we discuss in paragraphs 75 to 82 below, this demonstrates the difficulty which the public service can experience in paying the rate for the job. **In the context of the huge overall cost of such a major programme, the sums involved are very small; yet the risk to the reliability of the UK systems may depend on the recruitment of appropriate staff. It is not satisfactory that software work should be contracted out merely as an expedient.**

TACTICAL WEAPON SYSTEM

General

39. The tactical weapon system comprises such items as the sonar, command system, torpedoes and torpedo handling, electronic counter-measures (ECM), periscopes and discharge systems. The Comptroller and Auditor General noted that by the time of his July 1987 report the cost estimates had risen by 62 per cent in real terms (1986-87 prices), from £450 million to £728 million. This was due to additional requirements (26 per cent), under-estimation of development and production costs (20 per cent) and transfers from the submarine budget (7 per cent). These increases occurred early in the project. **We are glad to note that the National Audit Office now appears satisfied with the management and financial control of this element of the programme.**⁵⁹

40. The Secretary of State for Defence has reported to us that:

“The development programmes for the major items of weapon equipment have now consolidated and progress is satisfactory. The risk involved in bringing together the many diverse equipments to function as a system will be minimised by the integration work to be undertaken in the shore development facility at VSEL, Barrow. Production programmes are well established for the sonar suite, command system and the weapon handling system. The first production contract for the self protection system will be placed early in the new financial year. Significant savings have been made in the cost of this equipment by the adoption of later technology. Overall, the tactical weapon system is meeting its required programme”.⁶⁰

The Shore Development Facility

41. **Although the tactical weapon system “overall” may be meeting its required programme, some elements of its cause concern.** The main problem relates to the Shore Development Facility (SDF), which brings together in one place the various equipments so that “they can be worked on, assessed, improved and eventually used for all sorts of useful purposes ashore and not afloat”.⁶¹ Delivery of the sonar suite and the command system for the SDF are showing signs of slippage, but at present are not affecting the submarine build programme. With the exception of the self protection mast (SPM) system, production contracts have been placed for a substantial part of the Tactical Weapon System for SSBN 05.⁶²

⁵⁶HC 280 of Session 1987-88, Q.40 (Foreign and Commonwealth Office evidence to the Foreign Affairs Committee, 11 May 1988).

⁵⁷Director General Strategic Weapon Systems.

⁵⁸C&AG's 1987 Report, paragraph 3.11.

⁵⁹C&AG's 1987 Report, paragraph 3.13; Q.64.

⁶⁰Evidence, p15.

⁶¹Q.67.

⁶²Evidence, p20, A18; Q.67.

The Sonar Suite

42. **We consider that the Ministry of Defence has been less than frank with us over problems experienced with the sonar suite.** The previous Committee were told in 1985 that "the major tactical weapon development is in the sonar field", although the new sonar equipment would also be suitable for SSNs.⁶³ In 1986 they were told that "Contracts for the development of the Trident sonar suite have now been placed and work is proceeding satisfactorily".⁶⁴ In 1987 they were further reassured that "The development and production of the sonar suite for HMS VANGUARD is progressing satisfactorily".⁶⁵

43. From the Comptroller and Auditor General's investigation we found that the sonar suite had in fact suffered a three-year delay. Although half of this delay took place in the period 1980-83, the other half of the delay appears to have taken place after Plessey had been designated as Prime Contractor and while we were being told each year that progress was satisfactory.

44. According to the Comptroller and Auditor General, these further delays arose when:

"the Prime Contractor (Plessey) fell behind by nine months in the Project Definition and Demonstrator stages; internal reviews, investigations and re-organisation contributed to a delay of five months; and finally there was four months' delay while the relative merits of fixed price and incentive contracts for full development and the supply of prototype and pre-production models were considered and appraised."⁶⁶

MoD argues that each individual delay did not warrant inclusion in its report to the Committee, although it acknowledges that the cumulative effect presents "a less than satisfactory picture".⁶⁷

45. **We are less than satisfied with this answer. For three years the Government has made reports on the progress of the sonar suite which did not include important facts about serious problems and delays which had arisen. This is unacceptable.**

46. **The procurement of Trident is generally a well run programme. The political significance of the *Polaris* replacement has given the programme a high profile and has attracted more attention than some other high-spending programmes. Such demonstrable lack of frankness in respect of one element of the programme will inevitably tend to cast doubt on other elements which are accurately reported and where there is no cause for concern.**

Results of the delay to the Sonar Suite

47. We note the Comptroller and Auditor General's judgment that the delays to the sonar "increased the pressure on the overall Trident timescale and weakened MoD's negotiating power against the Prime Contractor's monopoly position."⁶⁸ The contract with Plessey had to be concluded on a target cost incentive basis rather than the preferred fixed price basis (the latter would have cost £23 million more). Significantly, the Secretary of State decided that dual sourcing, including European sources, should be considered for future sonar equipment. So far as the *Trident* programme is concerned, the Comptroller and Auditor General considers that the three year development/production overlap "may rule out competition for production of Sonar 2054 before the last submarine, other than at the sub-contract level".⁶⁹

⁶³HC 479 of Session 1984-85, Qq. 1813 and 1814.

⁶⁴HC 399 of Session 1985-86, p163.

⁶⁵HC 356 of Session 1986-87, pxvii, paragraph 3.

⁶⁶C&AG 1987 Report, paragraph 3.18. In February 1985 the Chief Strategic Systems Executive was asked specifically with regard to the sonar suite:

"How has this development been going? Has it been necessary to revise costs and schedules and so forth?" To which he replied: "The big milestone that has just taken place is the placing of the development and first production contract with Plessey's who are our major sonar contractor. I visited Plessey's just three weeks ago to satisfy myself that things were in good shape. Indeed, I came away well pleased with the progress that is being made on the contract."

HC 479 of Session 1984-85, Q.1815.

⁶⁷Evidence, p21, A19.

⁶⁸C&AG's 1987 Report, paragraph 3.19.

⁶⁹*ibid*, paragraph 3.20.

SHORE CONSTRUCTION

General

48. Major construction work in connection with the *Trident* programme, mainly in Scotland, is now well under way. The Clyde Submarine Base at Faslane and the Rosyth Dockyard are being modernised to cope with the requirements of SSNs and *Polaris* SSBNs as well as of *Trident* SSBNs. New roads have been built to improve the link between Faslane and the Royal Naval Armament Depot at Coulport, and to facilitate construction at both these West Coast sites.

Costs

49. The total estimated cost of *Trident*-related shore construction is £1 billion, of which £657 million or 66 per cent is currently attributable to the *Trident* budget. The figure used for shore construction in the *Trident* estimate is made up of £410 million on specific projects, contingencies of £150 million, PSA resource costs of £94 million and price variations on sunk costs of £3 million.

50. The PSA resource costs, given as £75 million in the Comptroller and Auditor General's 1987 Report,⁷⁰ struck us as being high, and we sought further details from the MoD. We were told that the current estimate had risen to £94 million at September 1987 prices, of which some 90 per cent was extramural expenditure on consultants' fees. The Ministry considered that this level of cost 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 co-ordinating an exceptionally large number of contractors on one site".⁷¹

51. In the early stages of the programme the shore construction costs were considerably underestimated. The construction programme does not appear to have been fully taken in hand until 1984, when the estimated cost had risen by 116 per cent in real terms compared with the provisional November 1981 estimate. The increases result from increases in the estimated cost of individual works projects (£159 million) and in PSA resource costs (£51 million), and from the addition in 1984 of a specific works contingency of £202 million to cover the many uncertainties in the programme.⁷² We note, for example, that the unforeseen cost of the removal of asbestos from the Faslane site amounted to £20 million. Since 1984 the estimate has not been revised substantially, although this may be largely attributable to the size of the contingency provision.⁷³ MoD now believes that it might get by with £160 million of this provision,⁷⁴ and indeed the evidence given to us suggests that the figure has now been reduced to £150 million.⁷⁵ These increases have been partly offset by a net reduction of £52 million in the proportion of some projects attributed to *Trident*.

52. Delays have been caused as a result of the need to meet planning and nuclear safety requirements. The Comptroller and Auditor General reported that "MoD and PSA expect the bulk of the project to be completed on time and they are making every effort to minimise slippage on critical projects", and we have been told that work at the Clyde Submarine Base "is in line with the planned timetable".⁷⁶ Nonetheless, while the programme is currently judged by MoD to be in good shape, MoD witnesses acknowledged that:

"... this is a very large project, a huge project. It still has a long way to go and it has a very tight timescale. It is also complex in technical terms and in management terms and it would be surprising if we had no difficulties at all with the completion of the programme".⁷⁷

In this context, we note that variable rock conditions have slowed up the driving of piles to support the shiplift at Faslane. These piles, some 160 feet long and 2 to 3 feet in diameter, must be driven so that their tops are located to a tolerance of between 3 and 6 inches. A pile that does not meet these requirements must be withdrawn and replaced. Although less than 10 per cent of piles have so far had to be replaced, this has resulted in some slippage to the contractor's planned programme.⁷⁸

⁶⁹*ibid*, paragraph 3.20.

⁷⁰C&AG's 1987 Report, page 16, Appendix 3, Paragraph 5.

⁷¹Evidence, p21, A20.

⁷²C&AG's 1987 Report, p16. The previous Defence Committee was informed at the time of the need for this substantial contingency provision; see HC 479 of Session 1984-85, p54.

⁷³C&AG's 1987 Report, paragraph 3.24; HC 189-I of Session 1987-88, Q.568.

⁷⁴C&AG's 1987 Report, paragraph 3.24; HC 189-I of Session 1987-88, Q.568.

⁷⁵Evidence, p21, A21.

⁷⁶C&AG's 1987 Report, p17 Appendix 3, paragraph 9; Evidence p15.

⁷⁷Q.68.

⁷⁸*Official Report*, 10 May 1988, col. 297.

53. By December 1987, some 40 per cent of the contracts by value had been let, with another 25 per cent out to tender.⁷⁹ The Secretary of State told us in January this year:

“In the past year asbestos clearance from the Faslane site has been completed, as has a large programme of site preparation at RNAD Coulport. New roads, which are part of the programme, are progressively being opened for use and these will relieve pressures from construction traffic on the towns and villages in the area. A number of large contracts have been let, including those for the Shiplift for docking submarines, and a Generating Station”.

“Tenders have been invited for a floating jetty at RNAD Coulport and a start has been made on the preliminary work for the refitting facility at Rosyth where, in the future, VANGUARD class submarines will be refitted and refuelled”.⁸⁰

54. The contracts announced in July 1987 were for a covered shiplift for lifting the new submarines out of the water for maintenance; a finger jetty which will provide two submarine berths, and a generating station and utilities building which will provide the Faslane base with power in the event of a grid failure. The shiplift and finger jetty will be built on 1,000 steel piles which will be sunk in the Gareloch, and to which we referred in paragraph 52. The package is worth £120m; when sub-contract work has been settled the value of the overall package will rise to £150m.⁸¹

WARHEAD, MISCELLANEOUS AND UNALLOCATED CONTINGENCY

General

55. This element of the *Trident* budget is large (at £2,590 million constituting some 29 per cent of the total programme) and is less precisely described or defined than other elements of the programme. In 1987 the unallocated contingency was put at 8 per cent of the total budget; this year it has been reduced to £595 million or less than 7 per cent of the total programme.⁸² No unclassified figure has been provided for the warhead programme; however, the Comptroller and Auditor General has observed that capital items account for only 5 per cent of the warhead programme.⁸³ This suggests that in 1987 the warhead programme was estimated at just over £1 billion, with the miscellaneous category at just under £1 billion.

The Warhead Programme

56. The Comptroller and Auditor General reported that the 1986-87 estimate for the warhead showed a real reduction of 16 per cent from the November 1981 estimate. We now understand that the correct figure is 8.5 per cent. One reason for this was that most of the expenditure on development and production of the warheads is incurred in the United States.⁸⁴ This includes the costs of attributable nuclear tests, and the purchase of elements of the re-entry body and certain warhead related components within it.⁸⁵ This accords with the US spend in this category of £940 million. It appears that savings have been found in this area over the past year.⁸⁶ The nuclear components of the warheads are being developed and constructed in the UK.

Purchase of special materials

57. The other main item under the warhead heading is special materials. We correctly speculated in our 1987 Report that savings in US spend from 1985-86 and comparable increases in UK spend reflected a decision to purchase special materials in the UK rather than from the US.⁸⁷ We did not at that stage have the benefit of the Comptroller and Auditor General's 1987 report, which showed that this decision had been taken as early as 1982.

58. The decision to purchase a “substantial proportion” of special materials in the UK was taken by Ministers “after taking account of the possible options for procurement, together with political, economic and employment considerations”. These considerations involved greater reliance on national sources of supply, and employment considerations at British Nuclear Fuels (BNFL). This option was shown to be only marginally more expensive than purchase from the US (and the target cost is currently based on comparisons with the US).⁸⁸

⁷⁹HC 189-I of Session 1987-88, Q.587.

⁸⁰Evidence, p15.

⁸¹*Official Report*, 9 July 1987, col. 250.

⁸²HC 356 of Session 1986-87, paragraph 24; Evidence, p19, A10.

⁸³C&AG's 1987 Report, Appendix 4, paragraph 3.

⁸⁴C&AG's 1987 Report, paragraph 3.27.

⁸⁵Evidence, p22, A26.

⁸⁶Evidence, pp17-18, A1 and A5. £1,078 million in 1986-87 (C&AG's 1987 Report, Appendix 1).

⁸⁷HC 356 of Session 1986-87, paragraph 23.

⁸⁸Evidence, p22, A28. C&AG's 1987 Report, p18.

Contractual arrangements for the purchase of special materials

59. In evidence to us the MoD described as "keen" the arrangements for purchase of special materials from BNFL. In his 1987 Report the Comptroller and Auditor General described the arrangements for the purchase of special materials from BNFL:

"The main contract includes a price escalation formula and provides for two price reviews in the future against the risk of significant changes in world market prices; it also allows for the quantities ordered to be varied, and for premature termination. Another contract includes a target cost/incentive arrangement, the target cost being based on comparison with the cost of US purchase. . . . Purchasing from a monopoly UK supplier creates a danger of paying excessive prices; but . . . MoD have tested their contract prices against the cost of buying US materials".⁸⁹

60. The stockpiles of special nuclear materials and the current production programme are sufficient to meet the needs of *Trident*, with the exception of highly enriched uranium which is processed for the UK by the United States.⁹⁰

Capital works Aldermaston and Burghfield

61. The final item in the warhead budget is for capital items. In 1985 we were told that the *Trident* programme would be charged only a small contribution of £24.5 million in respect of works directly attributable to it for the current construction works at the Atomic Weapons Establishments at Aldermaston and Burghfield,⁹¹ the total cost of which would be £321 million. The most recent figure now available is that *Trident* will be charged £52 million out of a total cost of from £879 million to £1,133 million.⁹² Thus while the cost of the total programme has trebled, the attribution to the *Trident* budget has only doubled. It should also be noted that of this £52 million, some £17 million consists of a contribution to a rolling programme—with an average expenditure of some £5 million a year—to refurbish and improve the equipment and facilities at AWE Burghfield.⁹³

Attribution to *Trident*

62. According to the conventions,⁹⁴ only that amount of the construction cost relevant to the extra production capacity required by *Trident* has been attributed to the Trident project. Although the original construction programme was not embarked upon because of *Trident*, the *Trident* decision transformed that programme in terms of scale and complexity—and eventually cost. We are not convinced that the proportion of these capital works attributed to the Trident budget provides an adequate reflection of the true cost to the nation of this programme, although we have no reason to believe that it departs from the appropriate accounting conventions.

The problems at Aldermaston

63. **Difficulties with the construction programme at AWE Aldermaston represent the area of greatest concern in the *Trident* project.** The origins of the construction programme go back to the Pochin report of 1978, which followed the detection of higher than usual levels of radiation in one part of the Establishment. That report highlighted deficiencies in the original facilities at Aldermaston. In 1980 it was decided to improve the facilities for processing plutonium and handling radioactive wastes to current health and safety standards.

64. The subsequent problems resulted from further decisions taken in 1982 as a consequence of the Government's choice of *Trident* to replace *Polaris*. *Trident* needed increased capacity and the new facilities to be in production two years earlier than had originally been planned. In giving approval to proceed, Ministers recognised that tenders had to be invited before detailed planning was complete and before the requirements had been fully worked out. This in turn meant that PSA was obliged to follow "a policy of sequential contracting whereby structures are designed and built

⁸⁹C&AG's 1987 Report, p18, paragraphs 5 and 6.

⁹⁰Q.57.

⁹¹Until recently these were known as the Atomic Weapons Research Establishment, Aldermaston and the Royal Ordnance Factory, Burghfield. They were amalgamated into a single Establishment, the Atomic Weapons Establishment (AWE), under a single Director, in September 1987.

⁹²Range of Hybrid estimates, 1987-88 prices. Evidence, p27, A2. See paragraph below.

⁹³Evidence, p27, A4.

⁹⁴Outlined by the C&AG in his 1987 Report, paragraph 1.6.

without a full appreciation of the equipment they will house".⁹⁵ The increased programme was beyond the capacity of local management to handle, and led to nugatory work as well as major delays.⁹⁶ The fact that the building contractors had had no experience of the nuclear industry must have presented a further problem.

65. In evidence to us, MoD witnesses acknowledged errors in being "slow to recognise the complexity of interfacing the elements of the project together and . . . to provide the experienced team necessary to maintain control such a large and totally unique programme". The latter task of coordination was underestimated until as late as 1986. When it was at last acknowledged, MoD looked to companies familiar with the North Sea oil and gas construction industry where, it felt, similar problems of cost, time and complexity had been faced.⁹⁷

The contract with John Brown Engineers and Constructors

66. Following a competition, a contract was let to John Brown Engineers and Constructors Ltd in March 1987 to advise and assist AWE, Aldermaston, with the co-ordination and integration of key projects in the construction programme. The company was asked to prepare a detailed inventory of the project and a forward project plan, to provide an estimate of time and cost, and to comment on forward management plans.⁹⁸

The management contract

67. Following advice from John Brown as part of its initial task, competitive tenders were issued for the provision of an integrated project management service to the Establishment, through to the completion of the capital project.⁹⁹ Six firms have tendered and we were told in March this year that the announcement of the choice of managing agent would be made at the end of April.¹⁰⁰ However, on 10 May we were informed that "the thorough evaluation and classification of competitive tenders which is necessary is taking longer than expected, but progress has been made and the successful contractor will be appointed as soon as possible".¹⁰¹ Even though the managing agent is to be appointed when the project is well beyond its half-way stage, MoD are confident that the necessary organisational changes have now been made and that the in-service date will still be met.

The delays

68. It had been anticipated that the A-90 production complex would be handed over to the Establishment by 1986,¹⁰² but this expectation changed to 1988 after the Government opted for the D-5 version of *Trident*. The position at Aldermaston was described by the Permanent Secretary of PSA towards the end of 1987 as follows:

"Construction work on the plutonium production building is now complete and we will be handing it over to MoD. The MoD contractor has began the task of installing the equipment. The boilerhouse, powerhouse and most of the site services work are substantially complete. Of the remaining Trident critical works for which we [PSA] are responsible there is the radioactive liquid effluent treatment plant and its control building to be completed and we are about half-way through in these cases".¹⁰³

69. The evidence which MoD gave us in March of this year described the A90 building, which will be critical to the production of the warheads for *Trident*, as "substantially complete".¹⁰⁴ Enough has been done for the programme of installing essential processing equipment to have begun, which in turn should be "substantially complete"¹⁰⁵ by the middle of 1990. Then the equipment will be proven to operate to the required performance before being commissioned

⁹⁵C&AG's 1987 Report, Appendix 4, paragraph 9.

⁹⁶HC 189-I of Session 1987-88, Q.570; C&AG's 1987 Report, Appendix 4.

⁹⁷Qq. 6 and 8.

⁹⁸Q.8.

⁹⁹*ibid.*, and *Official Report*, 12 November 1987, col. 303.

¹⁰⁰Q.8.

¹⁰¹Evidence, p37, A4.

¹⁰²The Defence Committee was told in 1980 that the MoD hoped to begin production of the warheads for *Trident* "round about the middle of the eighties, perhaps 1986" and produce them over a period of 8 to 10 years. (HC 36 of Session 1980-81, Qq. 944 and 980).

¹⁰³HC 189-I of Session 1987-88, Q.669.

¹⁰⁴Q.9.

¹⁰⁵*ibid.*

and eventually set to work using material of production quality in 1991. **The new facilities are planned to come into production early in 1992, and will then take over from production in existing facilities. Deliveries of finished components will begin before the end of 1992.**¹⁰⁶ This means that production at the plant will be starting two years late.

The rising estimates

70. In early 1985 the previous Defence Committee was given an estimate of £321 million for the works at Aldermaston.¹⁰⁷ This turned out to be an underestimate. By September 1985 the cost had risen to £370 million, with further slippage forecast.¹⁰⁸ These projects were then reviewed in the context of a wider group of 32 AWRE capital and works projects, estimated to cost £578 million (at August 1985 prices). This review was completed in March 1986. It produced a range of cost estimates between a best case of £836 million and a worst case of £1,069 million for the complete set of projects. The best case for those projects critical to *Trident* was estimated at £657 million at Autumn 1985 prices; further slippage of these projects was thought likely.¹⁰⁹

71. After adjustment to 1987-88 prices, the wider estimate rises to between £879 million and £1,133 million. This is a hybrid estimate, and so sunk costs are included at the price level at which expenditure occurred.¹¹⁰ The non-hybrid estimate, which would be more appropriate for purposes of comparison, will be slightly higher.

72. When, in 1982, Ministers were warned in writing of the uncertainties and risks of proceeding with the capital works programme at AWE, Aldermaston, without a full definition of the task involved, they were given two estimates: £262 million (the basis for financial approval, monitoring and control) and £292 million (the additional £30 million being the possible extent of cost increases).¹¹¹ It is not altogether clear whether they were warned of the risks in terms of time as well as cost of proceeding with the more ambitious construction project before the detailed requirements for *Trident* were available. It is now clear (with the benefit of hindsight) that it would have been better not to have proceeded with construction until the new *Trident* requirements could be fully incorporated.

Implications for *Trident*

73. **We are concerned at the implications of these problems for the *Trident* warhead programme.** Warheads are of course produced at the existing A45 facility and it had always been planned that this would be used to some extent for *Trident*. Production of fissile components began in January 1988. Work has also started at AWE Cardiff on non-fissile components and delivery of warhead-related re-entry body components from the US has also begun.¹¹² MoD has stated that it is therefore "in a good position to meet the planned in-service date of *Trident* as an effective deterrent without dependence for these early deliveries on progress with the production facilities".¹¹³

74. Because it had always been intended to use the A45 plant, the extra cost of running it for longer than originally intended is currently estimated at less than £10 million.¹¹⁴ The main problem is that it lacks the capacity for the total warhead requirement. MoD acknowledge that the A-90 facility is necessary "if we are to meet our requirements for the *Trident* programme in full".¹¹⁵ It is clear that there should be few problems, given the long lead times, in meeting the requirement for HMS VANGUARD using the A45 plant. This presumably provides the

¹⁰⁶Qq. 9 and 10; Evidence, p35, A(j).

¹⁰⁷HC 479 of Session 1984-85, Q.1858.

¹⁰⁸C&AG's 1987 Report, pp18-19, Appendix 4, paragraph 10.

¹⁰⁹C&AG's 1987 Report, Appendix 4.

¹¹⁰Evidence, p27, A2.

¹¹¹HC 189-I of Session 1987-88, p12, footnote 1 (review by the Controller R&D Establishments Research and Nuclear Programmes (CERN)).

¹¹²Evidence, p23, A31; Q.13.

¹¹³Evidence, p35, A(j).

¹¹⁴Q.14.

¹¹⁵Q.11.

confidence that the in-service date will be met. **However, if the requirements for the three other SSBNs that will enter service in the second half of the 1990s are to be met, then warhead production rates must be substantially increased.**¹¹⁶

Staffing at Aldermaston and Burghfield

75. **The delays in the construction programme have been compounded by problems in obtaining manpower with the appropriate skills,** and we explored this both in evidence and during our visit to Aldermaston. Concern was expressed to our predecessors about this problem in 1985 and 1986. In February 1985 there was a 9 per cent shortfall, excluding any allowance for wastage, at Aldermaston and Burghfield, compared with their requirement for April 1988. This carried the risk of insufficient staff to man the new production facilities, the *Trident* programme falling behind schedule and safety standards being affected. A Special Pay Addition was agreed in September 1985. This allowed for extra payments of up to £2,000 a year and was introduced as an incentive to recruitment.¹¹⁷

76. This allowance appeared to have some effect. Before its introduction there had been 85 resignations from the science and engineering grades in 1985, in addition to those retiring normally. In 1986 this figure dropped below 60, although it rose slightly in 1987.¹¹⁸ By April 1987 the shortfall of specialists and industrials as a percentage of the total staff requirement for all grades had fallen to 2.8 per cent, although there was still a 4.7 per cent shortfall in specialists. On industrials, MoD were confident that non-craft numbers would be met but that a sustained effort would be needed to meet the target for craftsmen.¹¹⁹ In general, the Ministry expressed confidence that manning levels would be reached by April 1988.

77. The Comptroller and Auditor General's 1987 Report concludes that

"The risk to the programme appears to have been reduced but there may have been some detrimental effect in other parts of MoD through transfers of staff to AWRE".¹²⁰

We are glad to note the Chief of Defence Procurement's assertion that MoD have since "managed to ensure . . . that the effect has not been of any significance".¹²¹

78. In 1987 our predecessors were told that the current rate of progress in recruitment and retention of staff gave grounds for optimism that the number required to meet the warhead programme would be achieved, although there were still difficulties in certain specialist disciplines, notably electronic engineers.¹²²

79. The MoD reported in December 1987 that in October 1987, out of the total manpower required for AWE Aldermaston, the shortfall was 67 specialists and 28 industrialists. After allowing for wastage this figure increased to 161 in the specialist area and 70 in the industrial area. The latest figures given to us for the shortfall showed the position at 1 March 1988: 111 in the Administrative, Executive and Clerical Grades, 65 specialists, and 40 craft industrials, with 10 above requirement in non-craft industrials.¹²³

80. Despite the MoD's optimism, there are still problems. Between 150 and 200 additional staff will be needed over the period that the A-90 plant moves into production. This is in addition to the 700-800 staff that have to be recruited by Aldermaston each year.¹²⁴ The age profile at Aldermaston means that "there is quite a bulge at the upper end of the age profile which means a lot of people are retiring. We have to run very fast to keep standing still from that point of view."¹²⁵

¹¹⁶It may be surmised that calculations for warhead requirements were based on the assumption that a single boat should be able to pose an effective threat to Moscow. Under the 1972 ABM Treaty the Soviet Union is allowed up to 100 interceptors, and so in principle this means 100 *Trident* warheads. Under announced policy each new SSBN will not carry more than 128 warheads.

¹¹⁷C&AG's 1987 Report, p20.

¹¹⁸Q.28.

¹¹⁹C&AG's 1987 Report, p 20, Appendix 4, paragraph 19.

¹²⁰C&AG's 1987 Report, p20.

¹²¹HC 189-I of Session 1987-88, Q.605.

¹²²HC 356 of Session 1986-87, paragraph 22.

¹²³Evidence, p23, A32.

¹²⁴Q.35.

¹²⁵HC 189-I of Session 1987-88, Qs.666, 682, 699.

81. Moreover, the allowance has gradually been eroded as a result of national pay increases and the "extreme pressures for manpower in the Thames Valley Area". The basic rate at AWE Aldermaston for skilled craftsmen is £130 per week compared with rates of pay in the surrounding area of £150-£230 per week. Rather than attempt to introduce a new special pay arrangement, MoD intends to use the flexibility made possible by the recent MoD-IPCS agreement. This provides some freedom of payment along various pay spines in order to reward special skills or to take account of skill shortages to provide the incentives for staff to stay.¹²⁶ **We hope that rapid progress will be made in this area, and note the Deputy Controller (Nuclear)'s confidence that the shortfall can be made good.**¹²⁷

82. We are aware that the pressure to bring production facilities into timely operation may tempt management to move experienced men from research to production facilities in order to ensure that production will not fall further behind. This could have a detrimental effect on research and development work undertaken at Aldermaston, and would be an unsatisfactory solution. We have, however, been reassured by MoD that very few personnel have been moved in this way.¹²⁸

Meeting the in-service date

83. **We have no reason to doubt the confidence expressed by MoD in meeting the in-service date for Trident, although this cannot yet be guaranteed. Meeting the in-service date is not the only requirement. Meeting the programme requirements thereafter could be more difficult.**

84. The Chief of Defence Procurement said in December 1987 that:

"... we have not changed the in-service date but sufficient elasticity was allowed in the programme which was a very sensible thing to do—to take up problems which occurred ... When I say there is no delay, we are reducing our degree of elasticity to a minimum. If we do not get enough people we are going to have more difficulty in meeting it."¹²⁹

We have been told by MoD in connection with the construction programme for the new production facility, that "there are planned contingencies of 'several months'".¹³⁰

Past reporting of progress by MoD

85. We have at present no grounds for doubting this assurance. However, some features of the MoD's reports to the previous Defence Committee do not encourage us to accept such reports unquestioningly in the future.

86. In January 1986 we were told that "Both the development of the nuclear warhead *and the construction of the new facilities at Aldermaston and Burghfield to support the programme continue to make satisfactory progress*" (*our emphasis*).¹³¹ We now know that at that time the Controller R&D Establishments Research and Nuclear Programmes (CERN) was in the middle of a major review undertaken because of serious concerns over delays and cost overruns in the construction programme.¹³²

87. In 1987 the Defence Committee were told initially by MoD that "the development of the nuclear warhead continues to make satisfactory progress".¹³³ The Committee then asked:

"Is production of the warheads for Trident on schedule? If there has been any delay what is its extent and to what is it attributable?"

MoD gave the following answer:

"The preparatory stages for warhead production are proceeding to schedule. There have been delays with some of the new production facilities at AWRE but the Ministry of Defence expects the planned weapon in-service date to be achieved."¹³⁴

¹²⁶Qq. 28-30; Evidence, p33, A(b).

¹²⁷Q.38.

¹²⁸Evidence, p23, A33.

¹²⁹HC 189-I of Session 1987-88, Qq. 663 and 709.

¹³⁰Evidence, p35, A(j).

¹³¹HC 399 of Session 1985-86, p163.

¹³²C&AG's 1987 Report, pp18-19.

¹³³HC 356 of Session 1986-87, p.xvii.

¹³⁴HC 356 of Session 1986-87, p.xxiv.

In the light of the later report by the C&AG, it is now clear that this answer was constructed to avoid answering the Committee's questions directly and to avoid repeating the earlier misrepresentation. This year MoD had no choice but to acknowledge the problems with the building works programme at Aldermaston. Its evidence states that:

"Measures were already in hand to improve the situation and despite this area of reported difficulty, the in-service date for the UK Trident system remains the mid 1990s."¹³⁵

88. We asked the Ministry whether it now regarded the evidence of January 1986 as accurate. The reply was:

"Yes. We consider the programme overall has made and continues to make satisfactory progress. The development programme has gone well for example and component production has started. Other areas of the programme such as the provision of new facilities at AWE have encountered delays and cost increases as described in detail in the Comptroller and Auditor General's report. Nevertheless our assessment remains that warheads will be available in time for the planned weapons system in-service date."¹³⁶

89. The MoD's statement in January 1986 did *not* relate to "the programme overall". The part that related to the development programme was accurate. The part which related specifically to the construction of the new facilities at Aldermaston and Burghfield was demonstrably inaccurate.

90. We consider that the MoD can have little cause for complaint if future assurances are not taken at face value. This is particularly a matter for regret in respect of a programme which is generally well run, and where substantial difficulties and complexities are being overcome by the skill and effort of those involved.

¹³⁵Evidence, p15.

¹³⁶Evidence, p23, A34.

PART V—IN-SERVICE DATE

91. The Ministry of Defence has consistently given the in-service date for *Trident* as “the mid-1990s” and in evidence to us and our predecessors has given the precise year in a classified form. However, the journalists who were briefed at Coulport in late October 1987 were given 1994 as the in-service date,¹³⁷ as were the lobby correspondents covering the Secretary of State for Defence’s speech at the Conservative Party Conference in October 1987.¹³⁸ Rear Admiral J Slater has been quoted speaking of full deployment by 1994–95.¹³⁹ The Comptroller and Auditor General’s 1987 report noted that the US *Trident* system “is due to be operational in the US in late 1989, some five years earlier than in the UK”.¹⁴⁰

92. When it was suggested to MoD that all this seemed to make the formal classification of the in-service date unnecessary, the reply was that the exact date upon which a warship becomes operational must be classified so as “to disguise as far as possible the programme for trials and working up in order to avoid vessels becoming easy intelligence targets”.¹⁴¹ While this limitation may properly apply to the actual day or even month, we feel it to be unnecessary restrictive, even for first of class vessels, when it comes to the year.

93. At any rate, this particular issue was settled by the Prime Minister when she gave a date of 1994 at a news conference after the March 1988 NATO Summit. It was of note, especially given Rear Admiral Slater’s comment quoted above, that MoD felt more comfortable with 1994 than with the alternative date used by the Prime Minister of 1993–94.¹⁴²

¹³⁷*The Independent*, 22 October 1987; *The Times*, 22 October 1987.

¹³⁸*The Financial Times*, 7 October 1987.

¹³⁹*Armed Forces Journal*, August 1987.

¹⁴⁰C&AG’s 1987 Report, paragraph 3.10.

¹⁴¹Evidence p24, A39.

¹⁴²Evidence, Qq. 2–4.

PART VI—EMPLOYMENT RELATED TO THE TRIDENT PROGRAMME

94. The downward revision of estimates of direct and indirect employment, noted in the previous Committee's 1987 Report, has continued. Although the estimate for the two peak years of expenditure—1989–1991—has not changed, the most relevant estimate, that for average employment, has been revised steadily downward.¹⁴³ Part of the downward revision is attributable to greater efficiency in building the submarines, which we welcome.

95. It was reported that "At its peak, work on HMS VICTORIOUS, the second *Trident* submarine, is estimated to provide jobs for about 3,000 people at VSEL in Barrow, and about 2,000 elsewhere in the United Kingdom". Together with the order for HMS VANGUARD, this will provide employment for about 7,000 people at Barrow as well as for several thousands elsewhere in industry.¹⁴⁴ It has also been stated that the construction programme for *Trident* in Scotland as a whole will, at its peak, create over 2,500 jobs; most of these will be at the Clyde Submarine Base.¹⁴⁵

96. As a result of the reduced role for RNAD Coulport with *Trident* as against that required for *Polaris*, the staffing requirement there will be lower. Consideration is being given to establishing alternative employment to replace that which will be lost when *Polaris* is no longer in service.¹⁴⁶

TABLE XI

Estimates of Trident-Related Employment

	Average		Peak Years (1989–1991)	
	Direct	Indirect	Direct	Indirect
December 1984 ¹⁴⁷			18,000	14,000
June 1985 ¹⁴⁸	9,000	7,000	17,000	15,000
December 1985 ¹⁴⁹	8,500	6,000	15,000	12,000
January 1987 ¹⁵⁰	7,500	6,000	15,000	12,000
January 1987 ¹⁵¹	7,000	5,500	15,000	12,000

¹⁴³HC 189-I, Qq.597, 598.

¹⁴⁴*Official Report*, 10 November 1987, col. 156.

¹⁴⁵*Official Report*, 9 April 1987, col. 351. The Government estimated that the construction of the shiplift, announced in July 1987, created 600 jobs for the West of Scotland as well as orders for suppliers of equipment and materials in other parts of the UK. *Official Report*, 9 July 1987, col. 250.

¹⁴⁶*Official Report*, col. 142, 8 December.

¹⁴⁷*Official Report*, 21 December 1984, col. 376.

¹⁴⁸*Official Report*, 4 June 1985, col. 148.

¹⁴⁹HC 399 of Session 1985–86, footnote 98.

¹⁵⁰HC 356 Session 1986–87, p.xiii.

¹⁵¹Evidence, p15.

PART VII—UK INDUSTRIAL PARTICIPATION

97. The 1982 agreement with the United States on the purchase of the Trident D-5 missile made it possible for UK firms to bid for work on the US *Trident* programme as a form of offset. Although there has been a 50% increase in the value in dollars of the contracts awarded to British firms, this represents only 2% of the amount to be spent by the United Kingdom in the US on *Trident*. In 1985 the Government suggested that the limited nature of the initial orders should not be taken to exclude the possibility of more substantial follow-on orders.¹⁵² Progress so far has been some what disappointing, although this year the Government again noted that "There are opportunities for follow-on orders during the production phase of the programme which has now begun" although it does not expect a "substantial increase in orders until 1990-91."¹⁵³

TABLE XII

Contracts Awarded to British Firms in the US Trident Programme

	<i>Number of companies</i>	<i>Number of contracts</i>	<i>Value (\$m)</i>
February 1985 ¹⁵⁴			31
July 1985 ¹⁵⁵	43	104	37
March 1986 ¹⁵⁶	51	185	44
September 1986 ¹⁵⁷	55	229	52
January 1988 ¹⁵⁸	59	337	85

¹⁵²HC 479 of Session 1984-85, paragraph 33.

¹⁵³Evidence, p15.

¹⁵⁴HC 479 of Session 1984-85, paragraph 33.

¹⁵⁵HC 399 of Session 1985-86, paragraph 75.

¹⁵⁶HC 399 of Session 1985-86, paragraph 75.

¹⁵⁷HC 356 of Session 1986-87, p.xiii.

¹⁵⁸Evidence, p15, as modified by Evidence, p37, A2.

PART VIII—INCIDENCE OF EXPENDITURE

98. We have at this stage no reason to revise the previous Committee's analysis of the incidence of expenditure. This is more important than the total figure in assessing the budgetary impact of the programme. The steady reduction in the *Trident* estimate means that the "proportion of the Defence Budget which the Trident programme takes over its procurement period is now less than 3% on average".¹⁵⁹ The peak figure is expected to be less than 6%.¹⁶⁰

99. There was only limited expenditure on the programme in the 1980–85 period. The expenditure has been rising steadily as the peak years are approached, will carry on at a high level throughout the first half of the 1990s, and then steadily decline.

100. Table XIII shows the levels of *Trident* expenditure in constant prices, and as a proportion of the Royal Navy's share of total equipment expenditure.

	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
a. RN share of total equipment expenditure	34	36	37	35	35	36	36	38	40	40
b. Trident-related expenditure included in a.	—	0.03	0.3	0.5	0.6	1.2	1.8	2.7	3.3	6.6
c. b in terms of constant 1987–88 prices (£ million)		5	48	94	112	175	281	391	550(e)	—

We asked for the proportion of RN equipment expenditure accounted for by *Trident* over the period of Trident procurement. The Ministry would go no further than 1988–89, on the grounds that "there is not a Ministerially approved equipment programme allocated between Service areas"¹⁶¹ for these years. We sought figures on Trident expenditure as a proportion of the Royal Navy's spend on new equipment, but the Ministry declined to give this information on the grounds that "the equipment element of the defence budget cannot be usefully divided between 'new' and 'other' expenditure because of the difficulties of definition".¹⁶²

101. It is also important to note that *Polaris* SSBNs will be operated well into the 1990s. Even with a reducing number of *Polaris* boats, current levels of expenditure suggest that running costs up to the phasing out of the last *Polaris* boat could be between £2 billion and £3 billion in total.

¹⁵⁹Evidence, p15.

¹⁶⁰Evidence, p36, A(c).

¹⁶¹*ibid.*

¹⁶²Evidence, p37, A1.

PART IX—OPERATIONS AND MAINTENANCE

102. As the in-service date moves closer, questions of operations and maintenance begin to assume greater significance. In this Report we consider the arrangements for the "refurbishment" of the *Trident* missiles at King's Bay Georgia and the additional manpower requirement while *Polaris* and *Trident* are both operational. We also consider briefly the question of *Trident* refitting.

SERVICING OF MISSILES

Arrangements for *Polaris*

103. The Royal Navy Armament Depot at Coulport currently contains the only *Polaris* assembly plant now in existence. There are facilities to load, unload and store the missiles, and also to test, assemble and service the missile propulsion and electronics. Coulport currently builds 35 missiles a year to replace all 16 missiles contained in each *Polaris* SSBN and to maintain spares. The stock value of missiles and spares is £620 million.¹⁶³

Refurbishment at King's Bay

104. In 1982 Her Majesty's Government reached an agreement with the Government of the United States that British *Trident* missiles would be processed with those of the United States at King's Bay, Georgia. This produced savings in the UK *Trident* programme of £770 million. Under the missile processing agreement the United Kingdom will pay £50 million over four years, plus £3.5 million over ten years for additional construction costs, as a contribution to the capital cost of jointly used facilities at King's Bay. In addition, the UK will meet the full cost of any additional construction costs at King's Bay occasioned solely by United Kingdom missile processing. These costs have been taken into account in calculating the saving of £770 million. The UK will be charged a percentage of the total King's Bay running costs related to the United Kingdom share of the missile processing work load. The current estimate is that this will be some £9 million a year during the initial outload period and probably of a similar order thereafter.¹⁶⁴

105. This arrangement with the United States avoids both the necessity of building an even more substantial facility at Coulport and the purchase of a larger number of missiles. At the start of its commission each *Trident* boat will be loaded with 16 missiles at King's Bay. The warheads will then be fitted at Coulport. When the SSBN is ready for her long refit—normally after seven to eight years—all the missiles will be returned to King's Bay, where they will be maintained. All servicing of the actual warheads will be in the United Kingdom.¹⁶⁵

"Ownership" of the missiles

106. There will not be specifically American or British *Trident* missiles. The missiles will instead be part of a pool, of which the UK owns a fixed number. As the individual missiles which an SSBN will take on at King's Bay after its long refit will be different from those which it unloaded before, it has been suggested that the UK will not in practice own the missiles it is now purchasing but will in effect be renting them.

107. Ministers have denied this interpretation. Thus the Minister of State at the Foreign and Commonwealth Office has said:

"It . . . becomes a matter of logistics as to how a rocket in need of refurbishment can best be refurbished and returned with the minimum of time and fuss to the job that it is intended to do. The Americans have discovered that if a rocket is to be fully overhauled it might be just as convenient to replace it with another missile. Refurbishment may vary from a minimum amount of work to total replacement of the missile. I cannot understand why we should call down difficulties on an arrangement that allows a missile to be fully overhauled every seven years to the point of replacement."

¹⁶³Evidence, p37, A4.

¹⁶⁴Official Report, 25 November 1987, col. 207.

¹⁶⁵Official Report, 10 November 1987, col. 156.

“... one can own a rocket for eight years, take it back and get another rocket, which one owns.”

“... the amount of work that needs to be done on each missile will be determined by the state of that missile when it arrives for refurbishment.”¹⁶⁶

The Secretary of State for Foreign and Commonwealth Affairs has noted that:

“The idea that we will only be leasing or hiring *Trident* missile is absolutely nonsense. We shall buy them outright and they will remain ours. ...

... We shall continue to own the same number of missiles at all times. They remain in United Kingdom hands at all times.”¹⁶⁷

108. Because the rocket bodies are being shared with the United States, and so may switch back and forth between the two SSBN fleets, it may be surmised that the United States Government is concerned with the maintenance of strict quality control. (So, of course, is the British Government). The UK has therefore had to commit itself to matching US standards of missile handling in all respects. There has been speculation that for this reason US officials will be at Coulport to ensure that the UK maintains quality control.¹⁶⁸ However, we have been told that a senior representative of the US Strategic Systems Programme Office will be stationed at RNAD Coulport only to provide technical advice and assistance when the UK requests.¹⁶⁹ The UK will maintain no complete *Trident* missiles as spares, though facilities being built at Coulport will be able to house an SSBN load of 16 missiles if necessary. In addition, stocks of spares covering a small range of *Trident* missile items will be maintained in order to replenish missile onboard repair parts carried by the submarine and to replace items during missile inspections and testing on submarines at the Explosive Handling Jetty.

109. The missiles will be operational for much longer between off-loading and major maintenance than do *Polaris* missiles. The off-loading will take place before a UK *Trident* goes in for her long refit, during which time she would be non-operational anyway. **We are confident that the British authorities will possess complete information about the missiles and will be able to assess their effectiveness and serviceability at all times when the missiles are operationally ready.** It should also be remembered that even taking into account British contributions to costs at King's Bay, the decision to maintain missiles there rather than at Coulport has produced substantial savings on the UK *Trident* programme. **The point at issue in the American, rather than British, refurbishment of *Trident* missiles is whether the independence of the British nuclear deterrent is to any degree compromised. We do not believe it will be.**

MANPOWER

The additional requirement

110. Each VANGUARD class SSBN will have two 130-man crews. Their complements will be some 20 men less than the much smaller *Polaris* submarines. HMS VANGUARD will be commissioned in 1992 and so many of the technical personnel must be assigned by 1990. 208 have already been selected. They are currently receiving normal submarine training but this year will begin taking specialist training courses in the United States. By 1991 a new *Trident* school will have been established at Faslane. Over the next few years it will also be necessary to continue to operate the *Polaris* SSBNs, and so there will clearly be a substantial requirement for additional trained manpower before and during the period when the operation of *Polaris* and *Trident* coincides. As *Polaris* boats come out of service having been replaced by *Trident* boats, this additional requirement will decline. The complement of a *Trident* submarine will be slightly less than that of *Polaris*, and so the eventual manpower requirement will be lower than at present.¹⁷⁰

¹⁶⁶Official Report, 22 October 1987, col 1012.

¹⁶⁷Official Report, 22 October 1987, col 949.

¹⁶⁸Financial Times, 23 October 1987: *The Times*, 22 October 1987.

¹⁶⁹Qq, 76 to 78.

¹⁷⁰Q.82.

The present situation

111. The current manpower total in the submarine service is some 8,000 men. Virtually all the officers, but only half the ratings, are volunteers. However, about 80% of those serving volunteer after four to five years for further service.¹⁷¹ During 1987 premature retirements from the trained submariner strength were 4.4% for officers and 4.1% for ratings. The MoD is considering measures to improve retention including more stable submarine operating programmes, improvements in sea/shore ratios and working conditions afloat and ashore and a reduction in enforced separation from families.¹⁷²

The size of the additional requirement

112. 800 additional trained submariners will be needed to run *Polaris* and *Trident* in parallel.¹⁷³ This requirement will reduce as *Polaris* boats come out of service. We note the Ministry's Evidence that "recruiting and training programmes have for some time been geared to achieving the increase and we have every confidence that it will be achieved".¹⁷⁴

ARRANGEMENTS FOR TRIDENT REFITTING

113. On present plans, it will be more than a decade before the first *Trident* submarine requires a refit. **Nevertheless, two requirements for Trident refits need a long lead time.** The first is the capital works at Rosyth to equip the Dockyard there to carry out refits. The second is the complex question of ensuring that the Dockyard will have the necessary skilled labour force to undertake the refits. This involves not only some highly specialised skills but also a workload which ensures that the people concerned are retained and employed when not needed for a *Trident* refit. The necessary skills are not easily recruited locally or in the short term. Before privatisation of Dockyards management, shortfalls in skilled manpower could be made up from Devonport or Chatham. This option is presumably not now available from Devonport, and Chatham has been closed. **We will return to these points in our next review of the programme.**

¹⁷¹Q.82; Evidence, p33, A(d).

¹⁷²Evidence p25, A48.

¹⁷³Evidence, p33, A(c).

¹⁷⁴Evidence, p25, A47

PART X—POLARIS

General

114. Until *Trident* becomes operational, Britain will remain dependent upon the *Polaris* fleet for its independent strategic nuclear deterrent. Two programmes have recently been completed to maintain this capability into the 1990s—the purchase of new rocket motors for the missiles from the United States and the development in the United States of a new front-end for the missiles (*Chevaline*). All four *Polaris* SSBNs are now able to patrol with a full load of *Chevaline*-tipped *Polaris* missiles.¹⁷⁵ The support costs of *Chevaline* account for “rather more than one-third” of total support costs for the *Polaris* A3TK weapon system.¹⁷⁶ British Aerospace, who were brought in during the development stage of *Chevaline*, have now been contracted to handle its in-service support, together with a number of other UK contractors and Atlantic Research Corporation of the US.¹⁷⁷

A possible fourth refit for HMS RESOLUTION

115. We have continued to take a close interest in the question of whether a *Polaris* SSBN will require a fourth refit if *Polaris* boats are to remain serviceable until their patrols can be taken over by *Trident*. The alternative to a fourth refit was described to the previous Committee as “enhanced commission lengths”. In 1985, that Committee expressed concern as to the wisdom of this policy, in the light of what they had been told about possible effects on an SSBN of advancing years.

116. In the last Parliament the previous Committee regularly considered the question of a fourth refit for HMS RESOLUTION and we raised the matter again with witnesses in this inquiry. We were told that this was “not a probability” and that if a refit was thought necessary, its extent would depend on the state of the boat when stripped down. **The decision on whether or not to put HMS RESOLUTION through some sort of refit is clearly related to the Government’s confidence in meeting the in-service date for *Trident*. The MoD now expects to take a decision in June this year on whether or not to give HMS RESOLUTION a fourth refit.**¹⁷⁸ This will be at a time when there is no reason to doubt that the in-service date for *Trident* will be met but before there can be full confidence that this will be so.¹⁷⁹ The costs at 1988/89 prices for a further refit, excluding any updating of capability, would be £102 million for a two-year refit starting in 1989/90 and £104 million for one starting in 1992/93.¹⁸⁰ The Ministry has pointed out to us that the programme effects of a fourth refit would have significant implications for RN manpower.¹⁸¹

Serviceability of nuclear submarines

117. We noted with concern allegations in the press about the number of malfunctions reported in the *Polaris* fleet.¹⁸² The Ministry of Defence submitted private evidence to us in some detail on this point. **On the basis of this evidence we do not consider that the matter needs to be taken further. We also called for a report on the incident on board HMS RESOLUTION at Faslane on 26th January 1988. Having examined the Ministry’s classified report on this incident, we do not consider that there is cause for concern.**

¹⁷⁵Evidence, p25, A52.

¹⁷⁶*ibid.*, A54.

¹⁷⁷*ibid.*, A53.

¹⁷⁸Evidence, p26, A58.

¹⁷⁹Qq 84-85.

¹⁸⁰Evidence, p33, (e).

¹⁸¹Evidence, p25, A56.

¹⁸²See, for example, *The Guardian*, 3rd March 1988.

PART XI—DECOMMISSIONING OF NUCLEAR SUBMARINES

118. We raised with the Ministry the problems involved in decommissioning nuclear submarines when they are no longer operational. The first nuclear-powered submarine, HMS DREADNOUGHT, is already at Rosyth after leaving service in 1982. No decision has yet been taken on DREADNOUGHT's disposal. By the year 2000 the Ministry expect a total of 10 SSNs and *Polaris* SSBNs to have been taken out of service.¹⁸³

119. We found the oral evidence given by MoD on plans for decommissioning disturbing. In particular, the witnesses could give no information about the timescale for reaching conclusions, making recommendations to Ministers or taking eventual decisions.¹⁸⁴ We therefore sought a written report on the present state of the Ministry's thinking, which is set out in our Evidence.¹⁸⁵ The final part of that report is as follows:

"The options for the disposal of nuclear submarine reactor compartments are under active consideration in the MoD and have been for several years. However the problems to which this subject gives rise, the often changing circumstances in relation to plans for the disposal of nuclear waste generated by the civil industry and the desirability of ensuring that MoD plans are broadly in line with civil practice means that it is not possible to say when a decision on the way forward will be reached. It remains the MoD's intention however that decisions will be taken in good time to ensure adequate and safe disposal or storage of this category of nuclear waste and to prevent unacceptable interference with RN operations."

We note the view of our witnesses that the vessels concerned could if necessary remain seaborne, at anchor, "for quite a long time".¹⁸⁶ We recognise the technical and political difficulties involved. **Nevertheless, we hope that there will be progress to report before long, and certainly before our next review of the *Trident* programme.**

¹⁸³Evidence, p33, A(g).

¹⁸⁴Qq 97-107.

¹⁸⁵P34, A(h).

¹⁸⁶Q.97.

APPENDIX A

List of Relevant Documents

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.

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.

National Audit Office, Report by the Comptroller and Auditor General, *Ministry of Defence; Trident Project*, HC 287 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.

APPENDIX B**List of Abbreviations and Terms**

ABM	Anti Ballistic Missile
AWE	Atomic Weapons Establishment
AWRE	Atomic Weapons Research Establishment (now AWE)
BNFL	British Nuclear Fuels Limited
C&AG	Comptroller and Auditor General
CERN	Controller R&D Establishments Research and Nuclear Programmes
Cmnd/Cm	Command Paper
DGSWS	Director General Strategic Weapon Systems
ECM	Electronic Counter-Measures
ELF	Extremely low frequency
HC	House of Commons Paper
HCDC	House of Commons Defence Committee
Hybrid Estimate	An estimate where all sunk costs are expressed at the price level and exchange rate at which expenditure occurred. All future costs are expressed at a single current price level and exchange rate.
IPCS	Institute of Professional Civil Servants
MoD	Ministry of Defence
PSA	Property Services Agency
PWR	Pressurised Water Reactor
R&D	Research and Development
RNAD	Royal Naval Armament Depot
SDE	Statement on the Defence Estimates
SDF	Shore Development Facility
SPM	Self Protection Mast
SSBN	A nuclear powered submarine armed with ballistic nuclear missiles
SSN	A nuclear powered (hunter-killer) submarine
SWS	Strategic Weapon System
TWS	Tactical Weapon System
VSEL	Vickers Shipbuilding and Engineering Limited

MINUTES OF PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT

WEDNESDAY 11 MAY 1987

Members present:

Mr Michael Mates, in the Chair

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

The Committee deliberated.

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

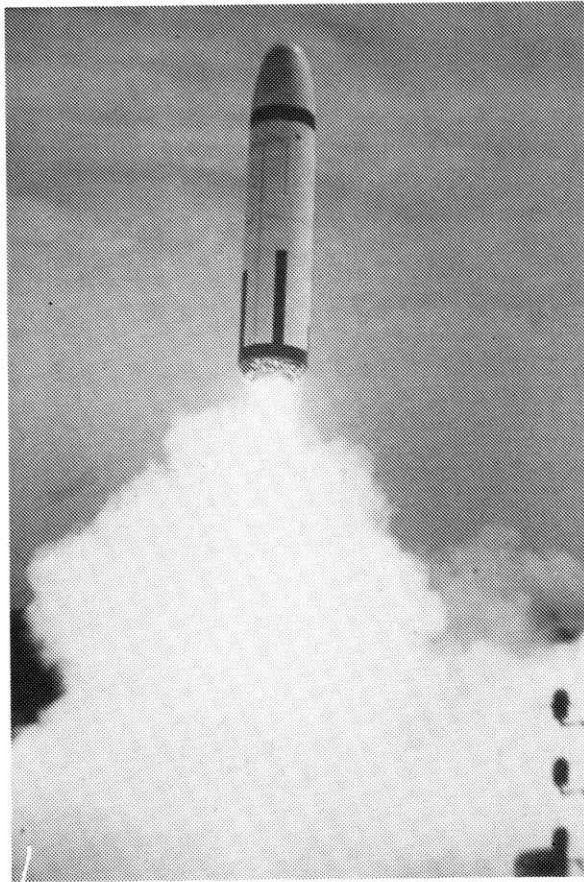
Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 119 read and agreed to.

Appendices A and B read and agreed to.

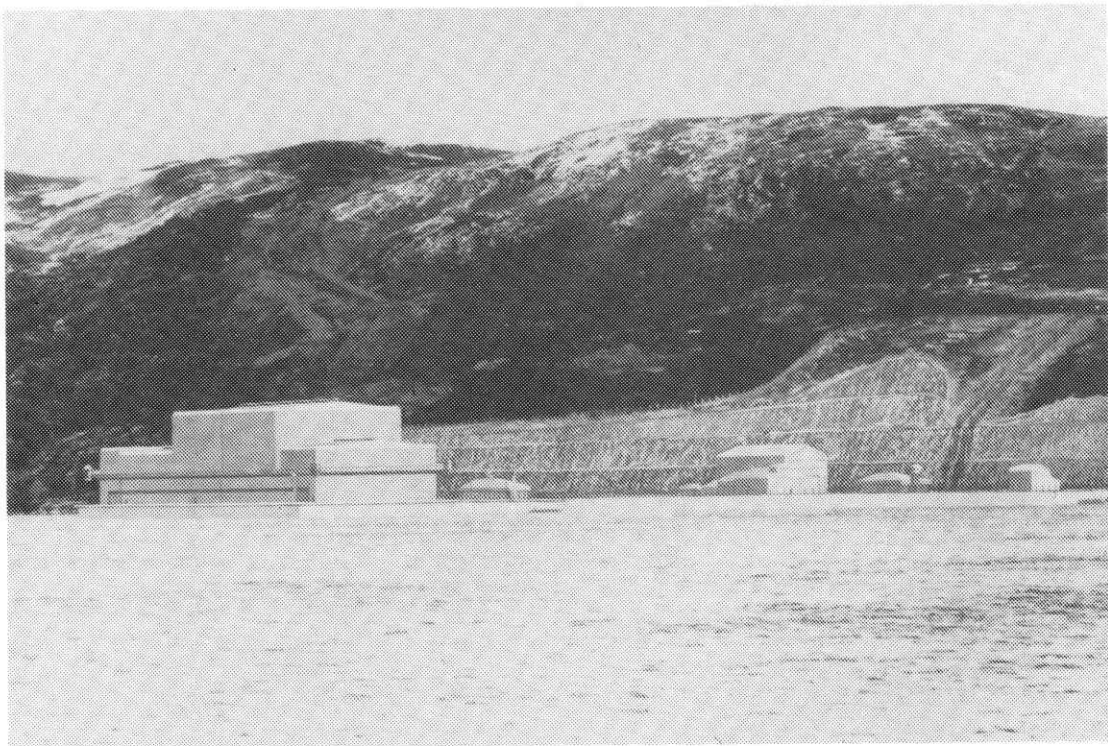
Resolved, That the Report be the Third Report of the Committee to the House.

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



Ministry of Defence

1. A Trident D-5 missile

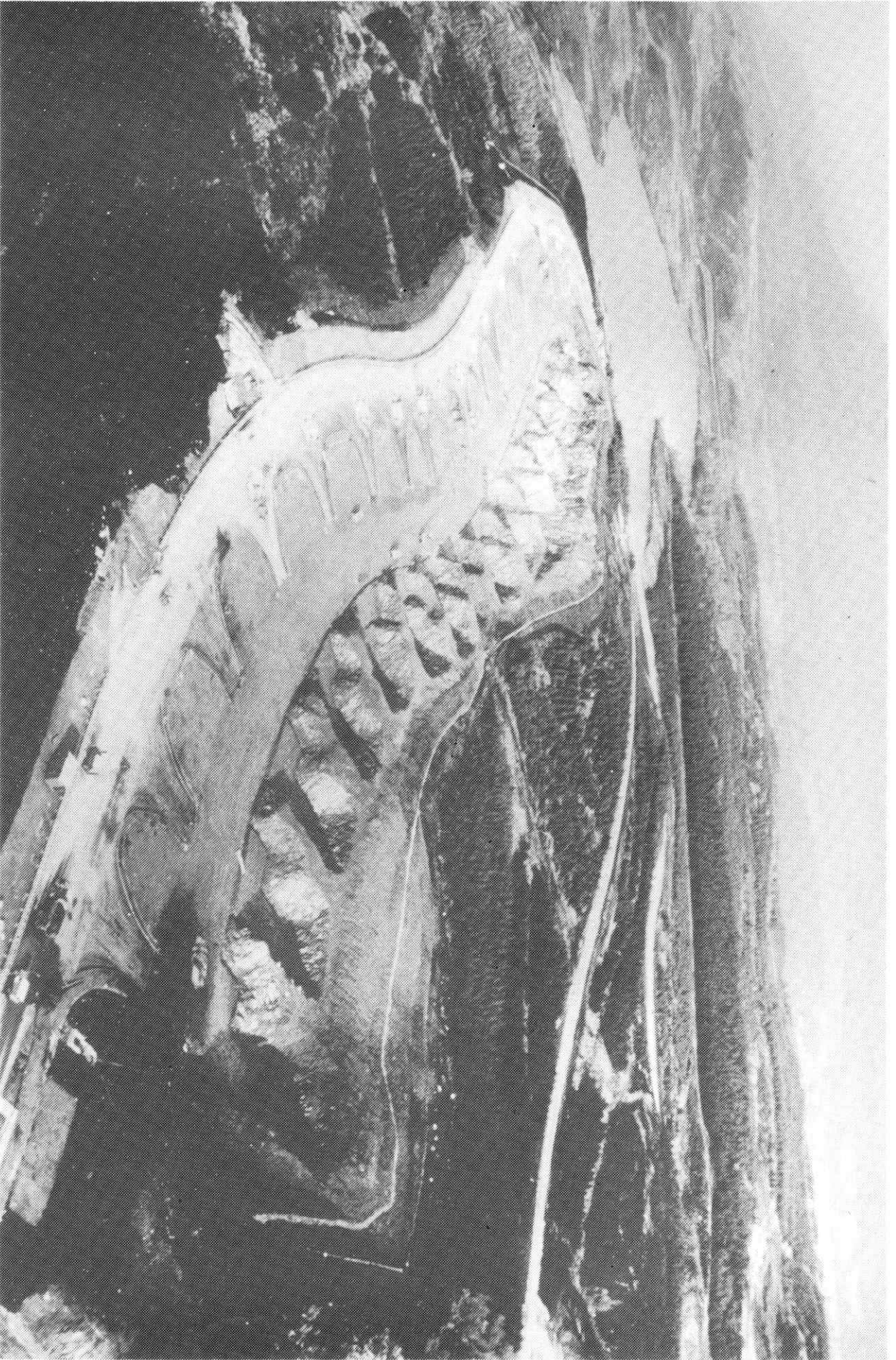


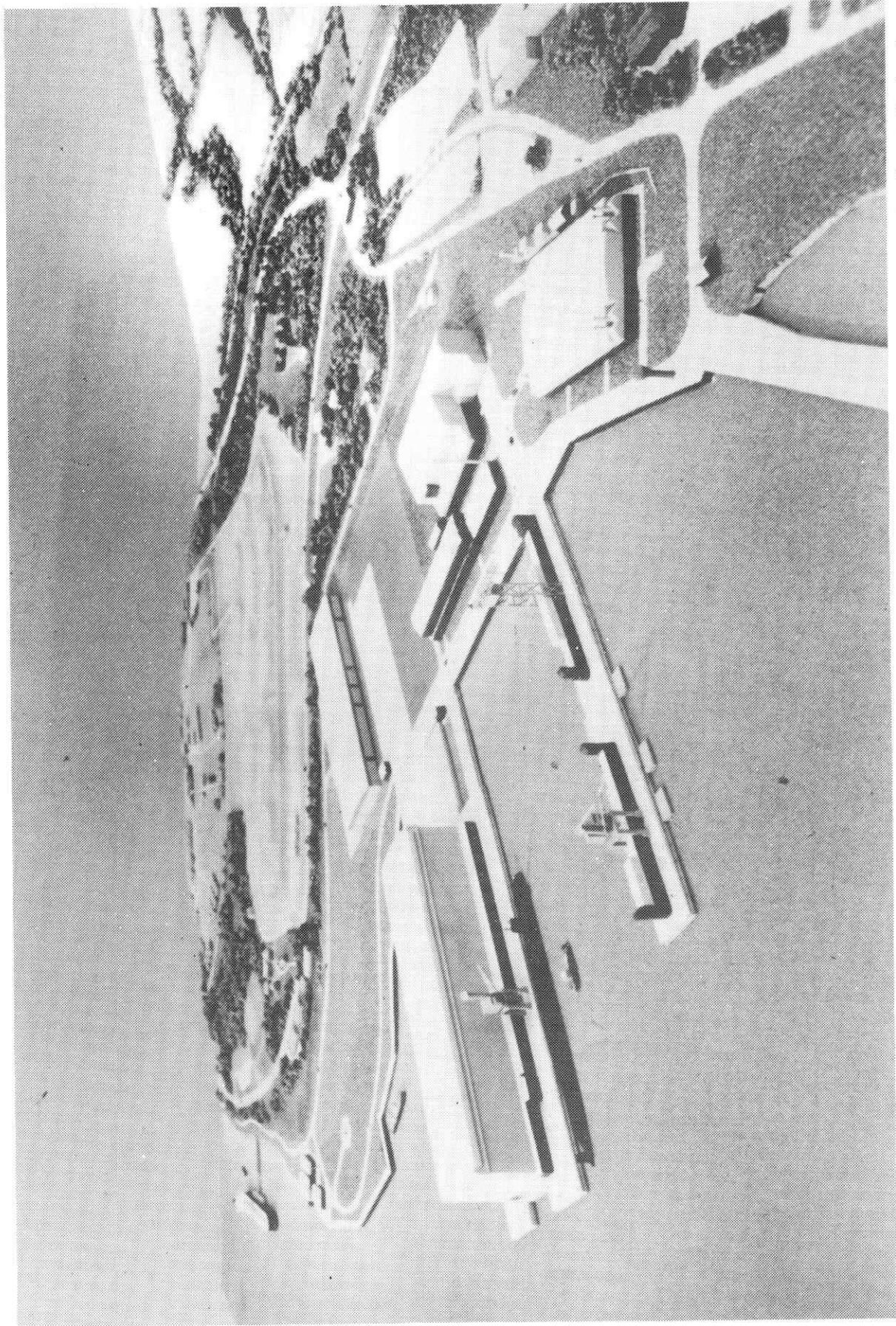
Property Services Agency

2. An impression of how the Explosives Handling Jetty at Coulport will look when finished. The main building will float on pontoons; inside, the loading and unloading of re-entry body assemblies and complete missiles can be carried out in a secure and controlled environment.

3. Rock excavation at RNAD Cowlport. This site will be able to house a full load of Trident missiles. See paragraph 108

Property Services Agency

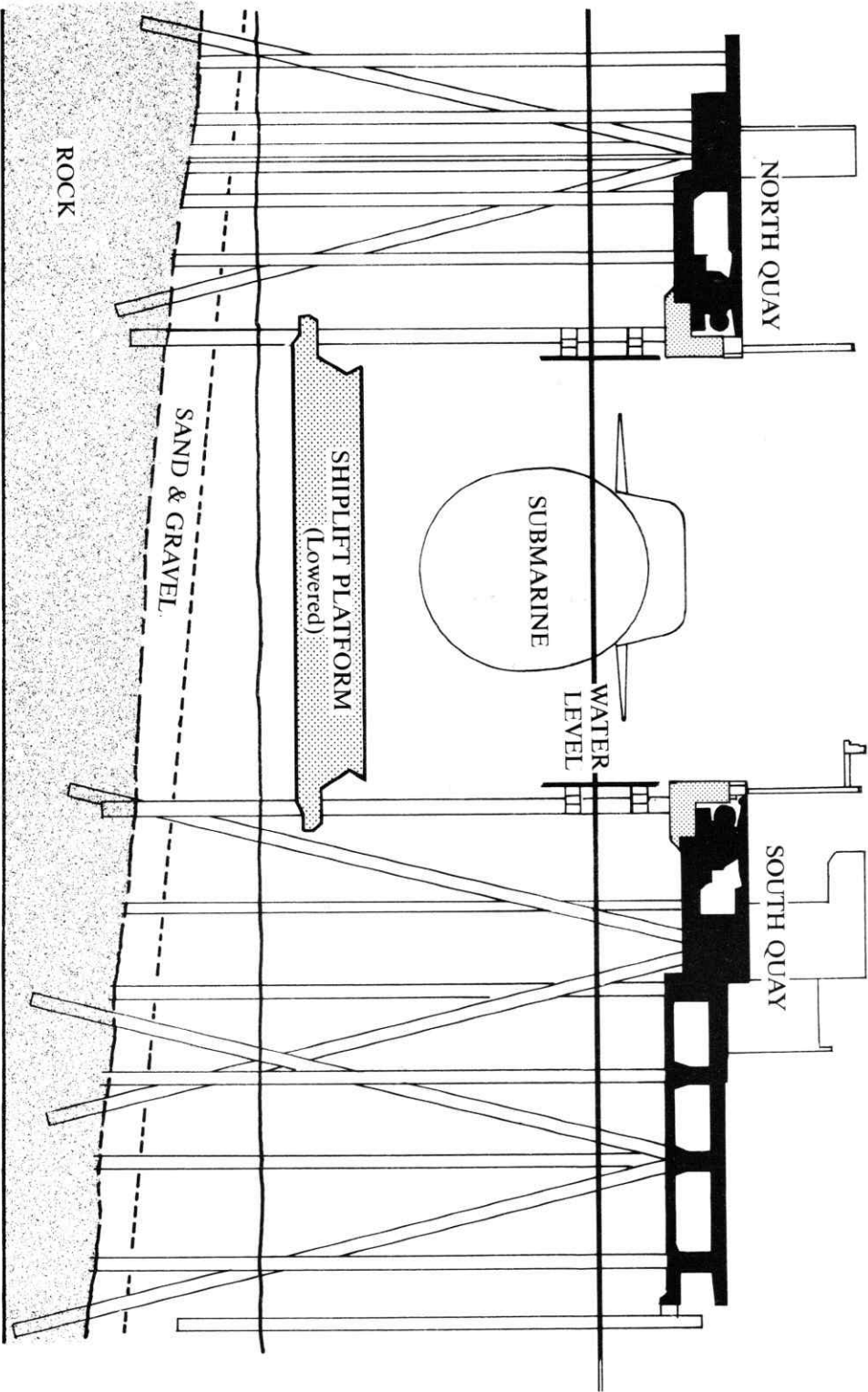




Property Services Agency

4. A model of the Northern Development Area at Faslane. In the foreground is the Finger Jetty, which will be a steel-piled, reinforced concrete structure designed to berth a Trident submarine on each side. The largest structure is the Shiplift, which is to extend 980 feet from the shore. The Shiplift platform will be covered by a shed 600 feet long, 170 feet wide and 125 feet high; roughly the height of a 10-storey office block. Also on site will be a power station, providing an independent generating capacity of 22 megawatts. See paragraph 54.

Ship lift
diagram



5. A cross-section of the Shiplift piling at Faslane. The piles are about 160 feet long and 2 to 3 feet in diameter. They must be driven into the rock of the loch bed so that their tops are located to a tolerance of between 3 and 6 inches. When we visited Faslane on 15 March 1988, 170 piles had been driven. By 11 May, 370 piles had been driven. When complete, the Shiplift will be capable of lifting a Trident submarine clear of the water on a platform raised by some 100 winches. See paragraph 52

Property Services Agency

MINUTES OF EVIDENCE AND APPENDICES

TAKEN BEFORE THE DEFENCE COMMITTEE

Asterisks in the Evidence and Appendices denote that part or all of a question or answer thereto has not been reported, at the request of the Ministry of Defence.

WEDNESDAY 30 MARCH 1988

Members present:

Mr Michael Mates, in the Chair
Mr John Cartwright
Mr Dick Douglas
Mr Bruce George
Sir Barney Hayhoe
Mr John McWilliam
Mr Jonathan Sayeed
Mr John Wilkinson

Examination of Witnesses

MR J PETERS, CB, Assistant Under Secretary of State (Materiel) (Navy), REAR ADMIRAL I H PIRNIE, Chief Strategic Systems Executive, MR J MABBERLEY, Deputy Controller (Nuclear), and MR B DAY, CB, Assistant Under Secretary of State (Fleet Support), Ministry of Defence, examined.

Chairman

1. Good morning, Mr Peters and gentlemen. It seems to be your permanent misfortune, Mr Peters, that whatever inquiry this Committee undertakes finishes up on your desk. Nonetheless you are especially welcome for the umpteenth time to the deliberations of our Committee. We welcome you and your colleagues and before we proceed, perhaps you would identify your team?

(Mr Peters) Yes. On my left is Mr John Maberley, who is the Deputy Controller (Nuclear) in the Controllorate of Establishments Research and Nuclear Programmes and has special responsibility for the nuclear weapons programme, including the capital aspects of AWE. On my right is Mr Bernard Day, who is the Assistant Under Secretary (Fleet Support). He is, therefore, the senior finance officer in charge of support aspects of the Trident programme, and on his right is Rear Admiral Ian Pirnie, who is the Chief Strategic Systems Executive and is responsible technically and financially for the submarines and the strategic weapon system programme and for co-ordinating all the related programmes. You have seen from his CV that Admiral Pirnie is recently in post but that he has had very many years' experience, both in the Polaris and the beginnings of the Trident programme. However, for the last four years he has been engaged in other business, so there is a gap there.

2. Thank you very much, Mr Peters. This morning, as you all know, we are taking evidence as part of our annual look at the progress of the Trident programme, although we will also be touching on some matters connected with the Polaris fleet. In the last fortnight or so we have been to Vickers Shipbuilding and Engineering Ltd at Barrow to see the progress on the submarine, we have been to Faslane to be briefed on the works there and the operation of the Polaris fleet, and to Coulport to see the new works there and last week to Aldermaston, where we received a comprehensive series of briefings and were able to see for ourselves the processes being carried out there, as well as the new works. You have submitted a helpful memorandum in answer to our questions, a declassified version of which has been released to the press. We have also put further questions to you in writing on aspects which may or may not come up this morning. First, can I ask you about the in-service date. As the in-service date is now firmly in the public domain and has been given to the press, do you not think it strange to insist on its still being classified?

(Mr Peters) The in-service date of the mid-1990s has not been classified for some time and has been a public statement for quite a while now. As regards the most recent statements, particularly what was said by the Prime Minister, you would hardly expect me to contradict the Prime Minister and there is no need to repeat what she said, as you say, Chairman, that is in the public domain but the MoD will continue to use the formula "mid-1990s", which is entirely consistent with what the Prime Minister has said, for the special reasons which are indicated in the answer to question 39 in the memorandum.¹

3. That is understood but just so that we are all on the same sheet of music, as it were, the Prime Minister's date of 1993-94 is not inaccurate?

(Mr Peters) The Prime Minister's date of 1994.

4. She said in her press conference following the March NATO summit the in-service date would be 1993-94?

(Mr Peters) Then I think in the second sentence after that she said 1994.

5. Very well. The C&AG's report noted that the US Trident system is "due to be operational in the US in late 1989, some five years earlier than in the UK." Did you see a copy of this report before it was made to the House?

(Mr Peters) I am sorry, the NAO's report? We certainly saw and indeed helped the NAO with details for their report, the one dated July 1987.

Chairman: Thank you. Now we have some questions about the AWE at Aldermaston.

Mr Cartwright

6. Could I start by asking about the construction programme for Aldermaston. There have clearly been some major difficulties about the progress of that programme. Can you tell us what inquiry there has been to establish the reasons for the delays?

(Mr Peters) May I start on this and then perhaps ask Mr Maberley. As you have said, Chairman, you asked us for a supplementary written memorandum, including a statement about what happened and whether there are going to be management changes and so on. We could include a general reply on this point in our written memorandum but obviously if you would like to pursue any particular point now I will ask Mr Maberley to comment.

(Mr Maberley) We have not had inquiries *per se* into the delays within the programme. What we have

¹Evidence, p. 24.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Cartwright Contd]

done is to supplement our improved day-to-day management with two reviews of the programme. One, in 1986 was an internal CERN (Controller Establishments Research and Nuclear Programmes) review which sought to identify the way ahead for the programme, I know you are familiar with that. The second was by an outside contractor, John Brown Engineering, in 1987 and that produced a definitive plan for the completion of the programme, confirmed that the programme timescales and costs were broadly as estimated in our 1986 review and added strong support to the measures already proposed by CERN. The amount of work needed to undertake the AWE programme has risen from nine programmes (our estimate in 1980) to 32 programmes and there were resulting cost escalations, as identified in the report of the Comptroller and Auditor General. Looking back, I think our conclusion has been that we had a problem that the programme grew in order to meet the full requirements of the Pochin Report on a timescale consistent with Trident, and we were slow to recognise the complexity of inter-facing the elements of the project together and perhaps I would say, slow to provide the experienced team necessary to maintain and control such a large and totally unique programme. The Committee will know that we have now appointed a management agent to fulfil this role and to manage the programme within the time and cost targets.

7. So would it be fair to summarise the main reason for the slippage as being a combination of unforeseen problems and an underestimate of the complexities of the Trident programme?

(Mr Maberley) Precisely.

8. Could I pick up the point about the John Brown recommendation for the appointment of a managing agent. Why do you think it was not felt that was necessary until John Brown pointed it out? It does seem a fairly routine thing to us to have in place on a job as complex and important as this one.

(Mr Maberley) I have already referred to the growth in the scope of work as the programme developed between 1980 to the period around 1986, including the requirements placed on that programme by the decision in 1982 to go ahead with the D5 Trident system. I think we recognised in the CERN review that whilst the new contracts were achieving milestones there was an immense complexity ahead in co-ordinating all the projects. We felt in this review that we simply did not have the depth of experience necessary within the AWE to manage these co-ordination aspects so as to clarify that the individual projects were well accommodated within our capability and were proceeding well. The co-ordination task, which was still ahead of us, was something which frankly we had underestimated until 1986. We were attracted to the North Sea oil and gas construction industry because we felt that they had experience of complex jobs with similar priorities of time and cost and, therefore, we contracted one such company, John Brown, who were tasked in 1987 with preparing a detailed inventory of the project, preparing a forward project plan, providing an estimate of time and cost and commenting on our forward management plans. Their report has been used as a basis for this future planning. They confirmed our feeling that we should use a management agent and, indeed, they suggested it was essential if we were going

to keep to the tight time and cost targets we had set ourselves. As I have just reported to the Committee, we have, in fact, implemented this recommendation of their report.

9. Could I now turn to one specific aspect of the building programme which is of particular concern to the Committee and that is the position of the A90 building. When do you now expect that to be fully operational?

(Mr Maberley) There are many stages to what is commonly known as the A90 programme. The stages are that the building itself, the construction of which was managed by PSA, is substantially complete. We are now undertaking a programme of installing essential processing equipment. That has commenced and will continue to be substantially complete by the middle of 1990. I say "substantially complete" because I am sure the Committee realises that there is an overlap between the various phases of such a complex programme. What will then happen is that that equipment will be proven to operate to the required performance, it will be commissioned and eventually will be set to work using real material.

10. It is that last process we are interested in. At what point does it, in my simple terms, start production?

(Mr Maberley) We will be putting production quality material through the facility in 1991. We anticipate production output from the building by the end of 1992.

11. Can you tell us what are the implications for the Trident programme if there is any slippage on that timescale?

(Mr Maberley) It is undeniable that this facility is necessary if we are to meet our requirements for the Trident programme in full. I will only say one more thing, Mr Chairman. We are making use of existing facilities to contribute to the Trident warhead production.

12. I am aware of that and I would like to return to that in a second, if I may, but in view of the importance of the A90 to the programme, can you tell us what are the main risks which might prevent its coming into production, as you say you hope, in late 1992 and what action are you taking to deal with those threats?

(Mr Maberley) The problems of bringing the programme home on time have been identified and they are very much in the area that I have already mentioned to the Committee, namely, that of co-ordinating a number of very complex actions in installing the equipment into an existing building, a now complete building, and planning that programme, which involves many people and many sequential and parallel processes in a timely manner. We have identified that. We have taken advice and this has, indeed, been the primary role of our managing agent thus far and will increasingly be so. We are confident that by organisation of our resources in this way and careful planning of the programme, as we now propose, we shall indeed meet the required dates for production.

13. There are presumably also staffing problems, which perhaps the Committee may want to raise with you a little later on, but there is one other question which I wanted to ask on this. You mentioned you are using existing facilities for production of warheads, which are presumably less efficient and, therefore, more

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Cartwright Contd]

costly than the modern facility at A90, which had originally been intended to produce the warhead for Trident. Can you give us some feel as to what the cost implications are of using this less modern, less efficient production facility for the early stages of the warhead programme?

(*Mr Maberley*) We have always planned to use the existing facilities to some degree in the Trident warhead programme.

Chairman

14. That is not an answer to the question.

(*Mr Maberley*) Excuse me, sir. The extent to which we are using it has changed in our most recent planning of the way forward. The cost of the change in plan (which is why I took the time to emphasise that we had always intended to use it) we believe is, by current estimates, under £10 million.

Mr Cartwright

15. That is the total cost of the alteration you are talking about, which encompasses, presumably, a somewhat longer time-scale, lower production, more costly production—the whole of that is covered by £10 million.

(*Mr Maberley*) By our current estimate, yes.

16. Presumably that would alter if A90 were delayed?

(*Mr Maberley*) Yes.

Mr Cartwright: Thank you very much.

Chairman

17. Who is going to be the managing agent?

(*Mr Maberley*) The managing agent programme is in two phases. John Brown Engineering have done the initial studies, which you are familiar with. The selection of a contractor for the remainder of the programme involving a much more extensive use of their manpower is currently the subject of a competitive tender.

18. When do you expect to select and announce the managing agent?

(*Mr Maberley*) By the end of April of this year.

19. How many candidates have tendered?

(*Mr Maberley*) Six.

Mr Douglas

20. Are you, in effect going to appoint a managing agent, or a series of project managers?

(*Mr Maberley*) We are going to appoint a managing agent.

21. Under whom will be a series of project managers?

(*Mr Maberley*) Under whom there will be the current project manager.

22. Who are all in-house MoD personnel, or PSA personnel?

(*Mr Maberley*) Currently they are a mixture of in-house Ministry of Defence and PSA people.

23. You think this is a satisfactory arrangement, when someone comes in as managing agent and superimposes himself on a series of project managers.

(*Mr Maberley*) I would not think that was satisfactory if that is what I thought he was going to do,

but with respect I do not think that is what we propose, since he will be supporting (with the skills that we do not have in project management in enough abundance) a dedicated Ministry of Defence Project Director who will oversee both his operation and the operation of the Ministry project managers.

24. So the terms of reference of all these individuals in their working arrangements will be mutually agreed before the final appointment is made?

(*Mr Maberley*) I believe that every contractor who has bid, or tendered, for the management agent contract has read and understood the terms of reference that he has got in respect of these individuals. We, of course, have, in the forward specification, already accepted those. So I think the problem has been met and solved.

25. You said you had gone back to North Sea experience.

(*Mr Maberley*) Yes.

26. What North Sea experience would superimpose a managing agent on in-house personnel? What North Sea experience can you allude to? That appears to me to be absolutely daft, on the face of it.

(*Mr Maberley*) I think there are two points I would make. Firstly, I would clarify my reference to North Sea construction industry. We recognised an industry and we talked with both the contractors that we appointed and others. What we were short of was the project management skills and manpower and the tools of the trade. What we went out to do was to obtain those and integrate them into our programme which was already in being and which we did not wish to interrupt. To answer specifically your question, the plan that we proposed was based on the discussions we had with the industry at that time, and the proposals that we offered were accepted and met by the people who tendered for the first phase and this second phase.

Mr Douglas: I am happy to leave it there, Chairman.

Mr Sayeed

27. You said that the end of 1992 was the expected date when A90 would actually be producing material. Does that mean September or December, is the first question. Secondly, and following from that, what latitude do you have in terms of months before it actually affects the Trident programme?

(*Mr Peters*) I wonder, now we are getting to rather more detail on this, if we might take it in private?

Chairman

28. Of course. Let us turn now to staff. In the answer you gave, A32, you said wastage rates of staff at Aldermaston had stabilised. At what level have they stabilised and is this historically a high or low level?

(*Mr Maberley*) The wastage rates prior to the award of Special Pay Allowance in October 1985 showed worrying signs of increasing. They had reached the point where, in 1985, for instance the science and engineering grades, 85 people had resigned as opposed to normally retiring. With the occurrence of the SPA there was a drop in those figures from 85 to just under 60 in 1986, and this figure has risen slightly in 1987 but not back up to the level that we had in 1985. We believe this is not showing the worrying signs that we had prior to the payment of Special Pay Allowance.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Chairman Contd]

29. Are you confident that the remaining shortfalls of staff can be met by future recruitment?

(*Mr Mabberley*) I think, yes, I am confident, but I should condition my confidence by an awareness that there are extreme pressures for manpower in the Thames Valley area. There is a national shortage of some skills and we have to recognise, I believe, that in some pay rates at AWE we are uncompetitive, so it is going to take a significant effort to maintain the levels of staff to stop wastage, or reduce wastage and recruit the staff that we want.

30. What considerations have you, in that regard, for increasing the Special Pay Allowance of £1,000 to £2,000 which was approved in September 1985?

(*Mr Mabberley*) That Special Pay Allowance, of course, has been eroded gradually by pay increases nationally and other pay increases that have affected the specialist classes. We are looking within the framework, for instance, of the current IPCS agreements to see whether we can use that agreement to offer to the necessary key staff at Aldermaston rates of pay which have, in the past, been available to them through the Special Pay Allowance. There is a correlation between, in our view, the Special Pay Allowance and the retention and recruitment of staff, and we shall take whatever measures within, for instance, the framework of the IPCS agreement to maintain the differential so we keep the staff that we need.

Sir Barney Hayhoe

31. Have you the freedom in-house in the Ministry of Defence to make changes in the Special Pay Allowance? Or do you have to refer these to the Treasury for approval?

(*Mr Peters*) We have no freedom.

32. You have to refer these to the Treasury?

(*Mr Peters*) We certainly would have to.

33. How long does that process take?

(*Mr Peters*) Since there has been such a general upheaval in the whole of the pay structure, especially for the IPCS, I think it would probably be a fairly complicated process to try and produce now some special pay arrangement that actually fitted with this new scheme. Therefore I suspect the answer may lie more in making whatever use we can of the new arrangements than trying to introduce some special one.

Chairman

34. Have you tried the Treasury on this?

(*Mr Peters*) I do not know the answer to that.

(*Mr Mabberley*) The answer to that, as of this moment, is that we have not, because we believe that we should investigate the use of the facilities that are currently there, namely, the IPCS agreement, for instance.

Mr Cartwright

35. Could I go back to A90 and ask again about staffing implications as far as this new production facility is concerned. How far will you need additional staff to commission A90, to train the workforce and to get it up and running?

(*Mr Mabberley*) This is a matter which is currently being assessed in some depth by the director of the establishment, but current indications are that it will require an additional short-term manpower requirement of between 150 and 200 people. It is that figure, of course, which contributes to the figure of the additional cost that I gave you previously.

36. Can you give us some feel for what sort of skills, trades and professions are involved in that 150 to 200?

(*Mr Mabberley*) I cannot, without reference to my office, give you a detailed breakdown, although, indeed, I could provide that by note to the Committee. My feel is that it would certainly involve craft personnel and other experienced industrial personnel, obviously the craft personnel offering supervisory skills in addition to their own engineering skills. I think it requires less in the way of scientists and graduate engineers.¹

37. But given what you have already said about the difficulties of recruiting staff in an extremely competitive local environment, how confident are you that you will get these extra people in the time-scale in which you need them?

(*Mr Mabberley*) Clearly we are confident because it is an inherent part of our programme.

38. I am not sure I follow that. It may be part of the programme, but you are telling me you are confident that you will achieve the programme because it is in the programme?

(*Mr Mabberley*) I am confident we will achieve the programme and, thereby, I have confidence that we can achieve this part of the programme. The point I am trying to make to you is that we are aware of the number, we are aware of the difficulty and we are content that we can do it. Currently we have to recruit around about between 700 and 800 people per year into Aldermaston, and when seen against that dimension I do not think that the figure of 150 to 200, looked at over a period of two or three years, looks quite so daunting.

Mr Douglas

39. To follow up briefly Mr Cartwright's line of questioning, can you give the Committee some feel for the differentials in wages and earnings terms between what you are offering for craft workers, say, in Aldermaston and the local economic community—a ball-park figure?

(*Mr Peters*) Perhaps the best thing would be to provide a note on this.

40. I have to accept that but I thought you might have some feel? Was it £200 a year out or £300 a year out?

(*Mr Mabberley*) No.

41. Surely you have some idea what you are bidding against?

(*Mr Mabberley*) My difficulty is that I do not think there is a general answer to that question. What I can tell you is that my personal feel on the matter is that it would be more than £1,000 per annum.²

Sir Barney Hayhoe

42. Are the management agents likely to make recommendations about staff recruitment and pay retention?

¹Evidence, p. 33, (a).

²Evidence, p. 33, (b).

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Sir Barney Hayhoe Contd]

(*Mr Mabberley*) That is not part of their formal task. They are certainly tasked with assisting us in indicating what people are needed, where and when, in order to complete the programme. I would be surprised if they did not in the normal course of their duty give us the benefit of their commercial experience.

43. But what happens if the benefit of their commercial experience in this field is such as not to fit into the pattern of the IPCS agreement or the arrangements for getting authority from the Treasury? It seems to be a very bureaucratic arrangement which may well inhibit getting the staff and retaining the staff to achieve this vital part of the programme.

(*Mr Mabberley*) I think that we would do as we did in October 1985. Having worked within the flexibility that we had at that time, seeing that those provisions were not adequate to solve the problem, we would make a submission to the Treasury. I think my answers have indicated to you that we have not done that and we are not at a point to do that because we have not exercised the provisions that currently exist.

Chairman

44. To sum up, is there going to be any increase in the special payment allowance or do you believe you cannot go down that route with the Treasury?

(*Mr Mabberley*) I do not think there is going to be a special pay allowance by that name. I think there will be a differential between the rates at Aldermaston and elsewhere in the Ministry of Defence and, indeed, there must be a bringing together of the rates of pay at Aldermaston compared with those available in the Thames Valley area.

45. And you are hoping to achieve those through, you said, the IPCS arrangement, is that right?

(*Mr Mabberley*) Yes.

46. Could you tell us a bit more about that so that we get a feel for what it is you are hoping to do?

(*Mr Mabberley*) There is an arrangement negotiated between the IPCS and the Ministry of Defence whereby we have some freedom of payment against various pay spines in order to pay people according to their special skills or the shortage of people with that skill or our need to attract it, and what this amounts to is identifying that that sort of payment is necessary within AWE and putting those staff on that particular pay structure, which puts them a few rungs further up the increment ladder than they would otherwise be.¹

47. And an arrangement like that is not subject to the dead hand of the Treasury?

(*Mr Peters*) That is already agreed.

48. Finally, before we move on, did John Brown have to compete by competitive tender to get the contract they are doing now as the managing agent?

¹Note by witness The flexible pay agreement is formally one between the IPCS and the Treasury covering all departments, including the Ministry of Defence. The arrangement described for flexibility of pay on a common pay spine is part of the agreement and needs no further reference to the Treasury. However proposals by a department to implement this flexible arrangement do require a specific approval by the Treasury in each case.

(*Mr Mabberley*) For the first phase, yes, they did, and for the second phase, they have competed with other companies.

49. How many candidates were there the first time?

(*Mr Mabberley*) Three.

Sir Barney Hayhoe

50. Is it not extraordinary that in the Ministry of Defence, with all its immense resources and experience and responsibilities, it was not able in-house to provide the necessary skills for the management agency you are talking of?

(*Mr Mabberley*) No, I think not. The task at Aldermaston is a one-off, once-in-a-lifetime, so even if we had been able to have the skills in the Ministry of Defence I am not sure that we would have wanted to attract them all to Aldermaston, simply because when we do finish the job we no longer need them. Industry's experience in these circumstances is exactly what we have implemented and that is that you bring in a management agent to do these specialised tasks.

Mr Douglas

51. But the PSA is, in fact, doing a similar job at Faslane? Am I not correct?

(*Mr Day*) The PSA have appointed a contract programme co-ordinator at Faslane who is responsible for ensuring the proper co-ordination of all the numerous contractors on the site and ensuring that they meet their critical paths and are not falling over each other and are co-ordinating with each other, so that the whole programme can be conducted in the most orderly, effective and economical way.

Chairman: Can we turn to warheads. Mr Wilkinson?

Mr Wilkinson

52. Doubts have been expressed—and I am sure Members of the Committee and our witnesses will have seen these expressed in the press—as to whether it will prove possible to have enough warheads to meet the needs of a full complement of missile on the planned in-service date of HMS VANGUARD and, indeed, even more doubts have been expressed over obtaining a full complement of warheads for VICTORIOUS when it comes into service later. Are these comments fair and accurate and are our witnesses satisfied that the in-service dates will actually be achieved?

(*Mr Peters*) If I could start off on that, yes, indeed, we are satisfied that the in-service dates for the Trident submarines will be achieved. As regards our warhead production, as you know, the Secretary of State made a statement at the end of February on this subject and we have been saying a good deal now about the arrangements which are being made to ensure that it will be possible to meet the programme, so in general terms yes, we are confident in-service dates will be met.

53. In general terms, Mr Peters, but the Public Accounts Committee was told by Mr Levene on 2 December last year that the in-service date had not been changed because he alleged that sufficient elasticity was allowed in the warhead programme but that "we are reducing our degree of elasticity to a minimum." Does that mean that there is no further stretch in the programme possible without further delays leading to a failure to meet the quoted in-service date?

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Wilkinson Contd]

(Mr Peters) I think what Mr Levene was saying was a very sensible general statement with regard to a very large and complex programme. As you know, there are all sorts of elements in this programme which have to be brought together by Admiral Pirnie—to ensure we have the means to build the submarine for the strategic weapon system to be installed, and there are all the support facilities to be arranged, and there is the programme at Aldermaston to make sure that the missiles have warheads. Because this is a very complex programme it has been planned all the way through with the right amount of margin for each stage to ensure that the final in-service date can be met. As the programme goes on—after all, it has been going on for a long time and will go on for a long time more—all the while the management structure, which is described in great detail in the C&AG's report, is making sure that those bits of the programme which seem to be lagging behind are given an extra push and that everything generally is kept in good shape. On the basis of what has happened so far, of our arrangements and of the fact that confidence grows as a programme like this continues and becomes more certain than it was before, we say the in-service dates can be met. Perhaps Admiral Pirnie may like to make a general comment on this subject.

(Rear Admiral Pirnie) I think all I could add, Mr Chairman, would be, as I have recently rejoined the programme, clearly I have been given considerable briefings on the state of the programme. Certainly on the basis of those briefings I would have every confidence that we are going to meet the in-service dates.

54. Can I just probe a little bit further, Chairman? When we are talking about elasticity we are not talking about reducing the number of warheads per missile, are we? I remember Ministers have publicly declared that Her Majesty's Government reserves to itself the right to select the appropriate number of warheads which will not necessarily be the same—and I am sure will not be the same—as in the United States' Trident IIs. The noble Lord, Lord Lewin in the other place, in a memorable debate said the Trident system was to be as minimal a deterrent as you choose to make it because of the flexibility in the number of warheads which are actually installed. Can we have that assurance that there is going to be no diminution of warheads owing to slippage in the programme which would make the penetrability, or capability of the system to destroy particular targets any the less?

(Mr Peters) The elasticity which Mr Levene was talking about related entirely to the programme and programme management and did not relate to any part of the capability. There is no intention of reducing any part of the capability.

Mr George

55. My question relates to flight testing. Based on open US sources I understand the first flight test of Trident was undertaken just over a year ago in January 1987 and I know their ninth test malfunctioned after three minutes. I would like to ask what the MoD does in terms of observing flight testing and, secondly, what is there available in the public domain as to the success of flight testing of the Trident II missile? Thirdly, what observations would you have for

assessing the success or otherwise of the flight testing as to how it might be applicable to us when it is deployed?

(Mr Peters) If I might start on that and, again, Admiral Pirnie might say something. What is in the public domain is what is published by the US Department of Defense after these flight tests. We, of course, have full access to all the information available, and on the basis of that we are satisfied that the development programme is going ahead well. Having said that, Admiral Pirnie might like to say a bit more about the details of flight testing and how we are involved.

(Rear Admiral Pirnie) I think the first point must be to observe that the rate of failure that they have seen in the American programme thus far seems a remarkably low failure rate. In respect of our liaison with them, as participants to the overall programme, we will be privy to the analysis of that failure. My understanding (although this is, as yet, informal) is that they are confident that they know the cause of that one failure and that they are confident that having identified it they are able, relatively easily, to incorporate a minor modification that should preclude that mode of failure again.

56. How would the failure rate compare with the Poseidon, or Polaris?

(Rear Admiral Pirnie) The reliability rates of those systems are classified and, therefore, I do not think I could answer that in public.

Mr George: Thank you.

Chairman

57. Would you say the decision to purchase special nuclear materials from British Nuclear Fuels has rendered the United Kingdom essentially self-sufficient in this area?

(Mr Maberley) Yes, I can confirm that the stock piles of special nuclear materials and our current material production programmes within the UK and at BNFL are sufficient to meet our needs for Trident, with the exception that we have highly enriched uranium processed for us by the United States.

58. Are you tempted to reconsider any part of this arrangement as a result of the strengthening of the pound against the dollar?

(Mr Peters) If I could answer about the strengthening of the pound against the dollar, this is obviously an important factor in a programme like this which spends hundreds of millions of dollars. As Mr Levene explained to the PAC on 2 December, we now have an arrangement whereby in order to reduce rapid fluctuations up and down we buy our dollars forward for at least the Estimates year's needs and, as a result, either the strengthening or weakening of the pound over a period is not going to make terribly much difference.

Chairman: Thank you. We will now turn to cost estimates in general.

Mr Sayeed

59. Obviously we are very gratified to note the reduction of the estimates for the SSBNs. First of all, how would you explain these savings?

(Mr Peters) I would like to explain them as being simply an example of proper project management and the use of proper procurement procedures. It is not really a question, I think, of learning lessons from this

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Sayeed Contd]

programme to apply to others; this is simply the application of what we now have as our standard system. I think at the beginning of any large production programme you always have a good deal of uncertainty, especially on this programme. These are gigantic submarines, we have never built anything like them, so naturally the estimates tended to be generous at the beginning and there was plenty of contingency. As the programme goes on and various items become more clearly defined, so you revise your estimates and harden them up to reduce contingency. You do not really have any firm ground under your feet until you get the first tenders for the first sizeable chunks and there is no doubt that the most important element in the price reduction here was the very successful contract negotiations for the first two submarines. In spite of the fact that VSEL is a monopoly supplier, we were able to take advantage of the competitive situation at privatisation to oblige the bidders to quote to us for the submarines as well, as a result of which we managed to force down their prices very nicely and the price we pay for the first submarine—or the target price—is £45 million less than the first tender. When we came to the second submarine we were able to base our negotiations on that to keep down the number of man hours in the contract by a large amount, and the result is we have saved another nearly £40 million compared to the first. As soon as you do that on the submarine contract you can start becoming much clearer about the costs of all sorts of related programmes. The tightening up that has been possible as a result of these tender prices has saved us—or has reduced from the original estimates—something over £400 million, and through the normal process of re-estimating costs all the time as you go along we have reduced it by, say, another £400 million. As I say, this is not the result of some brand new system, it is the result of applying proper practices in project finance.

60. I am very interested to hear your answer, Mr Peters. It would seem from what you have said that you are saying essentially that the contracts for the two submarines have been the principal cost savings now that the submarines are built in the UK and that would seem to indicate, therefore, that the cost savings have been mainly UK-based. When I look at your declassified answer to question No. 1, unless I have read it incorrectly it looks to me as though the real savings have been in the US and not the UK?

(Mr Peters) There are savings on both sides because we have been able to refine the estimates of the materials we will buy from the United States as their programme has become clearer, and we have been able to revise our own estimates because we now have a few firm contracts on which to base them. What I said, therefore, does apply to both sides of the Atlantic.

61. But the answer to my first question was that you indicated savings of some £400m on the first two submarines?

(Mr Peters) No, if we had saved £400m on the first two submarines we would be paying remarkably little for them. I am saying this is the amount by which the overall original estimate for the submarines has been refined.

62. I am sorry. If I look at the other real cost changes—this is the explanation of changes on the second page

of your declassified answer to question 1—it seems to be making a comparison between the 1981 estimates and the 1987/88 prices and it would appear to indicate that the costs in the UK have actually increased somewhat whereas in the US they have declined.

(Mr Peters) I am sorry, which line on page 2 are we on?

63. Explanation of changes, totals.¹ Have I misunderstood that box, which would seem to indicate to me the savings have been in the United States whereas there has actually been an increase in costs in the United Kingdom?

(Mr Peters) As regards the submarine part of the programme, what I have said is that there has been a reduction in real costs. In fact, I think the distribution is actually about £750m in the United Kingdom and about £100m in the United States elements of the cost. Other real cost changes include, for example, not only the works and support programme but also the tactical weapon system, which has, as is explained elsewhere, increased in real cost, so that is a net figure.

Chairman

64. What have been the main areas of the increase in costs of the tactical weapon systems?

(Mr Peters) There are two main areas. First of all, between 1981 and about 1984, when this increase happened, there was an addition of about £135m for improvements in capability. These were operational requirements which were found to be necessary after the original plans were made. Another £95m was as a result of our assessment of costs, mainly on the Sonar and the command system, so the main cost increases amount to about £250m. As a result of these cost increases a system of continuous monitoring and periodic reporting and review was imposed, since when the tactical weapon system budget has remained within its limit.

65. Given the past problems with the tactical weapon systems, what led you to set the contingency allowance at just over 6 per cent?

(Mr Peters) No, I think that is a misunderstanding of our normal conventions. For the Trident programme generally we assess the contingency against the amount of money remaining to be spent on the programme. On that basis the contingency for the tactical weapon system is about 10 per cent., which is pretty much the level which applies to other discrete parts of the production programme.

66. What measures are being taken to deal with the problems of the shore development facility?

(Mr Peters) The main measures are included in the normal process of trying to speed up those bits of the tactical weapon system which are lagging behind and the first pieces of which would go into the shore development facility. I think probably—though again Admiral Pirnie might know better than I, and almost certainly does—it is Sonar equipment which is one of the items at present.

(Rear Admiral Pirnie) Yes, I confirm that.

67. Are you confident that the major shore construction projects are now on time and on cost?

(Mr Peters) Yes. The shore development facility, as you know, is a normal feature of any major

¹Evidence, p. 17.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Chairman Contd]

programme; it is designed to have in one place the various equipments so that they can be worked on, assessed, improved and eventually used for all sorts of useful purposes ashore and not afloat. The shore development facility is going ahead. It is one or two of the pieces of equipment to be installed in it which are lagging behind at present.

Mr Douglas

68. Can you make any comment on the progress at Coulport and Faslane in terms of their being up to programme and within budget?

(Mr Day) As you will realise from your visit, this is a very large project, a huge project. It still has a long way to go and it has a very tight timescale. It is also complex in technical terms and in management terms and it would be surprising if we had no difficulties at all with the completion of the programme. Nevertheless, as things stand at the moment it is judged to be in good shape and we are quietly confident that it will come in on time and within budget.

69. I am asking you a specific question in relation to its design. Has the design for the floating jetty at Coulport been finalised?

(Mr Day) Yes, it has.

70. If so, why are you still not clear as to the type of material that can be used for the floating jetty? In a written answer yesterday in Hansard column 370, to a question from my colleague Dr Godman: "Of what materials is the floating jetty for the RNAD Coulport to be constructed?" Mr Chope said: "The tenderers are free to make offers using either concrete or steel for the pontoons."

(Mr Day) Yes, that is correct, they have been given the choice. We have invited tenders and we are waiting for them to be submitted.

71. Do you not have a preference?

(Mr Day) The question will be decided on the basis of the tenders which we receive.

72. How many people are being asked to tender for it?

(Mr Day) I think there are about half a dozen tenderers.

73. Half a dozen tenderers can offer either steel or concrete and you, the Department responsible, have no preference?

(Mr Day) We want to know what the facts are, what their views are and what their proposals are before we make a decision.

74. You want them to tell you of what material a very important piece of our facility there should be constructed?

(Mr Day) We want them to put forward proposals indicating what their technical proposals are, their technical assessment, indicating the costs, timescales and so on, on the basis of which we would then be able to take a well-informed decision.

75. Is this floating jetty going to be anchored in any way?

(Mr Day) It will have to be secured; it cannot just be allowed to float away.

76. What evaluation have you made of the securing if it is anchored? It could be piles; it does not have to be anchored?

(Mr Day) Yes. I should explain I am representing the Ministry of Defence and not the PSA and this is a technical question which you are asking, but obviously this has been thought about.

Chairman

77. Can we infer from your answer to our question A46¹ concerning the status and authority of the team of US officials to be stationed at Coulport, that they will only be there at the request of the UK and not at the request of the United States?

(Mr Peters) Chairman, the United States are free to make a request at any time, but that answer does say what the present position is.

78. Therefore, the initiative as to whether they are there or not remains with the United Kingdom?

(Mr Peters) Yes, but, of course, they could ask us, if they wanted to change it.

79. And we could decline?

(Mr Peters) Yes.

Chairman: Thank you. Can we now turn to manpower requirements.

Mr Wilkinson

80. Chairman, you will remember that in our questionnaire to the Ministry of Defence we asked (Q47) what is the additional manpower requirement for the submarine force by the early 1990s and whether the Ministry is confident that this can be met. In their reply the Ministry said that "It is not our practice to give planning projections beyond the public expenditure years, because these do not represent firm commitments formally endorsed by Ministers". May I say we did not ask for a projection of what would be achieved, and I note that the Ministry, in its reply, asserted that "there will be a substantial increase to cover the parallel running of the Polaris and Trident systems; recruiting and training programmes have, for some time, been geared to achieving the increase and we have every confidence that it will be achieved"; we were not asking for that so much as an estimate, now, of what will be necessary. Because, surely, if they are already making projections, which they have outlined in their answer, to recruit and train to achieve the increase necessary, they must know how many extra submariners will actually be required. Is it the additional 2,000 that has been reported in the press, for example?

(Mr Peters) I am afraid the real reason for the answer being in that form is one which will be very familiar to the Committee; it is one which has been quoted a number of times in recent evidence sessions, and it is the firm practice now not to give projections beyond the PESC years because, properly speaking, there is no provision beyond there and we are not entitled to assume it. Of course internal planning has been going on for a very long time, there are the usual enormous tables of complement billets and the hours everyone works down to the last stoker—of course there are not any stokers any more—and what is needed

¹Evidence, p. 25.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Wilkinson Contd]

to meet this bulge. It is intended to meet it and it will be met.¹

81. There is an important point here. In the Ministry's answer it says "recruiting and training programmes have, for some time, been geared to achieving the increase." In other words, things are actually happening which are having a material effect on the manpower composition of the fleet. In our last session on manpower policy it was made clear to us that manpower is sadly declining in the fleet, very much in line with the way forward, the White Paper 8288 of 81, yet we are going to have this substantial extra submarine commitment. How is it going to be met and what is the estimate of numbers? As I said, these things are happening; we need some quantification.

(Mr Peters) I cannot give you quantification, partly because it is not my part of ship and partly for the general reason I mentioned earlier. The answer to the question "how can we be sure, if manpower is generally going down like that, that we can suddenly meet a greatly increased requirement on the part of the strategic force" is that Trident has priority.

82. I am glad to hear that because we have learned from your answer to question 48, about the current rate of premature retirement from the submarine service. For the calendar year, 1987, premature officer retirements were 4.4 per cent, premature ratings retirements were 4.1 per cent and the trained submariners 4 per cent. In other words, at a time when people leaving the submarine service prematurely, and leaving the Navy prematurely too, we are going to need extra submariners. Will we, therefore, have to initiate policies such as a substantial increase in the number of non-volunteers going to the submarine service—press-ganging people in?

(Mr Peters) Admiral Pirnie might like to make a general comment on how the submarine service in general, and how the strategic systems service is manned.

(Rear Admiral Pirnie) I cannot answer your question as to the future because I am not aware of the figures as yet. I would make two points: firstly, of course, as you realise, we are talking about a bulge in the requirement and the overlap; therefore, it is, in manning terms, a difficult but not a continuing problem. The complement of the Trident submarine is going to be slightly less than that of a Polaris submarine, and therefore when we have achieved a steady state in this submarine's running and the Polaris has been phased-out the manpower requirement will have returned to a similar or slightly lower level that appertains now. We are, therefore, talking of a bulge in requirement in that context. If I could try and answer the other part of your question, the figure of in excess of 4 per cent trained strength premature voluntary retirements, which is a figure where we, naturally, are looking at trends as well as absolute figures: a figure such as 4 per cent, I think, would be viewed, in industry generally, as remarkably low. Nonetheless, it is a matter of concern to us. To try and answer your question about whether it would need coercion, it is true now that not everyone serving in every submarine had a voluntary wish to join. I think it is an interesting reflection of the submarine service that after a period of time (and I am not sure whether it is four or five years,

¹But see answer given in Evidence, p. 33, (c).

but some figure like that) people are then asked if they wish to remain in submarines, and the percentage of those that volunteer to remain in submarines at the end of that period is extremely high. By saying "extremely high" I mean in excess of 80 per cent.

83. Very creditable. You have highlighted this transient problem of bulge, but there is the overlap between the remaining Polaris boats and the first Trident submarines. Ought you not to be doing something about that manning problem right now? For example, by stopping, or at least curtailing, the reduction of the overall manpower decline of the fleet and, secondly, perhaps considering increasing submarine specialist pay? You say how much people like the submarine world once they get into it—is not a factor of that the additional remuneration?

(Rear Admiral Pirnie) I am sure that is one contributory factor but I feel that their conditions of service are another. I am afraid I cannot answer your question. I know that plans are laid to meet the increase of requirement, but I do not think it would be proper of me to express a view as to whether I feel we should be halting the decline in the manpower strength of the Navy.

Chairman: Can we now talk about the potential fourth refit of RESOLUTION.

Mr Douglas

84. Mr Peters, you know we have given attention to the probability of a fourth refit. Can you give us some feel for how long RESOLUTION would be able to be operational without a fourth refit?

(Mr Peters) First of all, may I say there is certainly not a probability of a fourth refit. A possible fourth refit is simply a contingency in case we need to run on RESOLUTION longer. It is not, at present, a contingency that is going to arise because we have confidence that 05 will meet its in-service date. If something very odd and unexpected arose we might wish to run on one of the Polaris boats. The circumstances will determine whether it is necessary to have a large refit or a small refit or possibly no refit at all.

85. With great respect to you, Mr Peters, that is not really an answer to my question. I understood that a decision as to whether RESOLUTION or some other boat, but presumably RESOLUTION, would have another refit was likely to be made by June 1988. I really asked how long could RESOLUTION remain operational without having to undergo a fourth refit. Have you got a feel for that?

(Mr Peters) No, I have not. Generally speaking, the material state of these submarines on refit has been surprisingly good when they are stripped down for the first time. They look a jolly sight better than most other things you see in the dockyard when they are prepared for refit. What I can say is that in our answer we have said a similar refit to the ones before would cost more because you would be refitting an older hull. In fact it would almost certainly not be a similar refit which would involve a long extension of life. If it did arise it would either be a lesser refit, which would cost much less, or, as I say, it might be no refit at all, depending on the state of the boat. I cannot, I am afraid, give you a feel for how long that would be.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Douglas Contd]

86. We are getting on to June. Have you had any discussions with the dockyard, presumably Babcock at Rosyth—or FKI as I think we now call them—as to the probable or possible cost implications and, indeed, because of the rundown in dockyard manpower both at Rosyth and Devonport, any specialised skills which they might have to retain and keep in-house, because if you are going for a further refit these highly specialised skills will have to be in place? Although I know that Trident boats are likely to go there as well, we still have a problem of keeping a team in operation at Rosyth.

(Mr Day) Clearly the Director General of Ship Refitting, who is the customer organisation for the Ministry of Defence, will be fully consulted about the costings which are required in order to assess how much we might have to pay for any given standard of refit, and obviously some sort of consultation with the contractor would no doubt take place as well.

87. But you are not aware of it?

(Mr Day) I am not aware of what the present position is as of today but quite clearly any costings would have to be looked at by the people concerned.

88. It may be in due course we might get a note from the Ministry about that?

(Mr Day) Yes, indeed.¹

Chairman

89. Up to the year 2000, how many nuclear submarines (SSBNs and SSNs) do you expect to have to decommission?

(Mr Peters) I am afraid without reference to my various handy reckoners I cannot answer that. I do not know if anyone in the back row knows the answer. I am just trying to think. We are thinking about the very first SSNs, I suppose.

(Mr Day) We could give you a figure for this outside the Committee.²

90. Are we talking about two, four, ten?

(Mr Peters) It would probably be two. I do not know if it would be as many as four.

91. What ways of decommissioning (both methods and using contractors) have you considered?

(Mr Day) We have to consider various methods and no decision has yet been taken. Land disposal is one possibility; sea disposal is another. These are the main options.

92. How many contractors do you think have the expertise to carry out nuclear submarine decommissioning?

(Mr Day) It depends what you mean by “decommissioning”. The dockyard contractors, with advice from the Navy on nuclear safety and so on, would be able to carry out the initial phases of defuelling and removal of the primary reactors and that sort of thing.

93. All of them?

(Mr Day) All the contractors?

94. Yes?

(Mr Day) I am talking about the dockyards here. We have facilities for dealing with nuclear submarines

at both Devonport and Rosyth and defuelling would be a function which could be carried out at the dockyards, as, indeed, has already happened.

95. Not just defuelling but the whole decommissioning process?

(Mr Day) It would depend what process you were then going to adopt.

96. That is what we would like to get your thoughts about.

(Mr Day) As I said, we have not taken a decision and we are still weighing up the possibilities. Whether one goes for some form of land disposal, whether one cuts the boats up and disposes just of the reactor compartment by means of land burial or whether one dumps it in the sea—these are all options that we have to consider and assess. There are a lot of very complicated technical problems involved and obviously political problems as well.

97. What is the timescale of this decision-making process? When do you think you can come up with a plan?

(Mr Day) There is no specific timescale because the vessels could remain seaborne at anchorage for quite a long time, if necessary. On the other hand, it is not the sort of problem one wants to defer indefinitely, particularly if one were going for some form of disposal which involved a lot of preparation, choosing sites and so on, so it is something that we are currently thinking about but I would not like to forecast exactly when we should be able to take a decision.

98. When do you think you might reach preliminary conclusions on the way forward?

(Mr Day) I am not sure there is a distinction between preliminary conclusions and final conclusions here. One would have to decide one way or another which course one were going to take.

99. Let me try again. When do you think you might give recommendations to Ministers?

(Mr Day) When we have completed our assessments.

100. This year, next year, five years, ten years? We would like a feel for where we are in this process.

(Mr Day) This is something on which we would hope to be able to make up our minds without too much delay but there are a number of factors involved.

101. I am sorry, I must press you harder. What is “too much delay”? Is it this year, next year, five years, ten years?

(Mr Day) It would depend on circumstances as to when was the best time to take a decision.

102. Have you got a target for reaching conclusions?

(Mr Day) No, I have not.

103. No-one has said, “I would like to have your thoughts by 1990”?

(Mr Day) We have not got a definite target for a final decision on how to dispose or when to dispose. Those subjects are still under consideration.

¹Evidence, p. 33(f).

²Evidence, p. 33(g). See also Q.119.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued]

[Chairman Contd]

104. Mr Day, I am sure you are not trying to be evasive. We would like the faintest clue as to whether it is urgent, whether it is for this summer, whether it is for Christmas, whether it can wait for next year, whether we need it in the next decade.

(Mr Day) If necessary it could wait for some time.

105. "Some time" is something like "the near future" to us. Could you help a little?

(Mr Day) It depends on one's assessment as to how long it is going to take in crude terms for those very big and very well-built hulls to rust away.

106. Now, you are not proposing we have reached the end of the century and the decommissioning of somewhere between two and four submarines without any thoughts of a plan for their disposal, are you?

(Mr Day) No, I would hope we have a plan well before then.

107. We have had "near future", "some time" and now "well before". I must ask you if you can tell me whether you are going to reach the outline of a plan this year or next year?

(Mr Day) No, I cannot because I do not know. There are still a number of factors to weigh up and I do not know how long it is going to take.

108. What are the factors?

(Mr Day) The factors are the technical nature, to begin with, the risks to the hulls, the time it takes for the hulls to reach the stage when there is any sort of danger.

109. Why is that a factor in the timing plan, please?

(Mr Day) Because the longer they will last in water (as DREADNOUGHT, for example, is at present moored) then, in theory at least, the longer one can delay actually having to take action. This is one factor; other factors are (if one is going for land disposal) what are the suitable environmental conditions—topographical, geological and geographical conditions?

110. I am not talking about delay in taking action, I am talking about delay in making a plan as to what you should do eventually.

(Mr Day) What I am trying to say is that one cannot make a plan until one has made an assessment of a number of very complicated factors which we have not yet completed.

111. How far away are you from completing that assessment?

(Mr Day) I am sorry, I do not think that I can really give you a clear answer to that because it is a complex subject, and it will take time to—

Mr Douglas

112. If you do not mind, Mr Day, because of the area I represent (I have not got a dockyard in my constituency) but DREADNOUGHT is lying at Rosyth consuming very considerable dock space.

(Mr Day) Certainly.

113. Really, you are saying to this Committee, if I interpret it correctly, there is no final decision or there is no real plan to determine when DREADNOUGHT might be removed from that very valuable naval base at Fleet Dockyard to be put somewhere else?

(Mr Day) Yes, that is right; we do not have a date for that.

114. If I interpret you correctly—and I do not want to misquote you in any way—it may not be until the plates rust away?

(Mr Day) No, I am not saying that we would leave it as long as that; what I am saying is this is one of the factors involved. If you are talking about time-scales (I was asked how urgent it was) what I was trying to indicate was that there is an awful lot of rusting to be done yet—if you really want to take that sort of attitude towards it. Obviously we want to deal with it responsibly. I am not trying to be difficult. The fact is at this stage we have not got a definite view either of how to dispose or when to dispose, and I am not, at this stage, in a position to be able to tell you when we might come to a conclusion; we are looking at all the possibilities.

Mr Douglas: The problem is obviously not the reactor because, as I understand it, the reactor is not in the hull at the present time—it has been stripped. What we have got as the problem is the background of inherent radiation in the hull system itself. So we have got that lying at Rosyth for a time that is indeterminate, consuming valuable dockyard space, and at the present time you have no final ideas on what to do with this boat.

Chairman

115. Or even any preliminary ideas?

(Mr Day) The options are still open and we are considering what they are. As Mr Douglas says, it is not a question of the reactor itself generating radio-activity, it is a question of the impregnation of the hull—the reactor compartment—and what, in effect, amounts to an intermediate level of radio-activity. That is the problem we are dealing with.

Sir Barney Hayhoe

116. How is the disposal task that you have spoken of for radio-active material being linked in with the similar problems on the civil side? Presumably there should be a national policy involved, or are the Ministry of Defence looking at this hull as a Ministry of Defence problem and not linking it across to the wider national problem?

(Mr Day) Clearly we have to have regard to national issues, but we are the only people who have got this very particular and very difficult problem of great big submarines to get rid of.

Mr Sayeed: They are going to have great big power stations to deal with—they have great big power stations now.

117. Yes, the size of this problem is growing all the time. Are you saying that the Ministry of Defence are just really looking at this in-house and thinking of being able to dispose of their radio-active material on Ministry of Defence sites, or are they proposing to go more widely and seek civilian sites where, of course, very elaborate procedures would have to be followed?

(Mr Day) We are, of course, in touch with other Departments on this subject, but for something like a submarine, if you were going to go for a land site, it would almost inevitably have to be a coastal site, which would not necessarily meet the requirements of civilian operators.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Sir Barney Hayhoe Contd]

118. Have you identified the sort of sites that might be available?

(Mr Day) This is the sort of thing that we are looking at. One has to consider what sort of geological structures, and so on, are required; what sort of places might enable us to exercise adequate control over any disposal, if it were to be on land, and provide adequate safeguards for the longer-term future.

Mr Cartwright

119. I only wanted to clarify a little further the question of the scale of the problem. It may be unfair to press Mr Peters as to absolute detail at the present moment, but presumably by the year 2000, apart from SSNs, the bulk of the Polaris force will have come out of service, and does that not give us more than two submarines to worry about?

(Mr Peters) I wanted to come back on that, if I could. In an earlier answer I was thinking in terms of SSNs²; in fact I have no proper basis to make an assumption, we will do this in our note. Quite clearly we will have a sizeable problem and it is a problem which, of course, we will share with the other nuclear submarine operating nations, all of whom have had it longer than we have.

Mr Wilkinson

120. Although we have not been able to get an insight into the thought processes, if any, within the Ministry of Defence on the decommissioning and disposal of nuclear submarines, there is case history, particularly from the United States—or, I suppose, we could follow the Soviet example and have an accident off the American coast in deep water in the Atlantic! What is the experience in the United States, and how would this correlate if we were to follow it?

(Mr Day) The United States has rather a large desert in which they have conveniently buried one or two of their submarines. We have not yet located a large desert in this country!

Sir Barney Hayhoe: You are not suggesting you are looking for one!

Mr McWilliam

121. Has the Ministry of Defence any direct relationship with NIREX?

(Mr Day) The waste disposal company, you mean?

122. Yes.

(Mr Day) I am not aware of a direct relationship on this submarine.³

(Mr Peters) I understand we have no direct relationship with them, although, of course, we know what they are doing.⁴

123. Has the Ministry of Defence an indirect relationship via another Department with NIREX?

(Mr Day) We consult other Departments who are concerned with the problem of disposal of nuclear material, and they may well be in direct touch with NIREX.⁵

²see Q90 and Evidence, p. 33(g).

³Note by witness Although the Ministry of Defence and NIREX confer periodically.

⁴Note by witness This answer refers to the Sea Systems area of the Ministry of Defence.

⁵The Ministry of Defence have subsequently told us that they are in touch with NIREX.

124. Are you seriously telling the Committee that when the decision was taken to build nuclear submarines no thought was given to the disposal and there has been no constructive thought since, yet we have got a nuclear submarine tied up?

(Mr Peters) If I could go back to the very beginning, the Admiralty decided—God bless it—to go into nuclear propulsion for submarines back in the early 1950s, and a very good decision it was. At that time, naturally, everyone's attention was on how one could actually put in the propulsion unit and build it into a submarine which would be safe and fit to operate for a large number of years. There were quite enough problems to contemplate at that time without thinking too much about what on earth we should do with it when we were finished with it.

(Mr Day) Nevertheless, there has been serious consideration and there is continuing serious consideration of this problem. All I am trying to say is that we have not yet reached a decision and I am not in a position to say, at this stage, when we might do so.

125. Was not that, environmentally, a little bit insensitive?

(Mr Day) I do not think that we can be accused of being environmentally insensitive when we are, in fact, thinking very hard about what is a very difficult problem and a problem which all countries who operate nuclear facilities find difficult. The last thing that we want to do is to be insensitive or irresponsible. That, in fact, is the very nub of the problem, why it needs to be looked at so carefully and why it takes time to reach a decision.

Chairman: I think I can say, Mr Day, without fear of contradiction, when the Committee has discussed this matter they will wish to return to the charge on the Ministry of Defence and get some slightly more forthcoming answers than we have had.⁶

Mr George

126. Could I ask a couple of questions on the Trident submarines construction status. Do you have an estimate as to the percentage of each Trident submarine that will be completed as of a certain date, say 1990/91 onwards?

(Mr Peters) Yes, indeed. There are construction plans which are used as the basis for all the submarine construction work and at present the SSBN 05 is continuing on its plan very well and SSBN 06 is just beginning.

Chairman: We have seen those plans.

Mr George

127. There was some dispute over the date of the submarines being fully operational. Can you give some indication of what the time-lapse is from a submarine being completed, sea trials, handing over to the Navy and then its being fully operational, and is it comparable with other Navies in terms of the time-lag?

(Mr Peters) To start with, as we have said in other sessions, the time between acceptance from the builders and acceptance into the operational fleet is filled with a good many essential trials and the length of these will depend very much on what you are trialling. In the case of the first Trident submarine, obviously these trials will be very important indeed. This is taken account of in

⁶Evidence, pp. 34-35.

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr George Contd]

the programme planning and there is an appropriate time set aside for the various weapon system and other trials which have to be carried out.

128. Do you have an estimate as to how long that will be? I know in the United States it is ten months. I wondered how we compared with the Trident programme? Is it ten months?

(Mr Peters) Clearly the first boat's tests take longer than the follow-on. Was the US estimate for the old-style Trident or the new-style Trident?

129. The Trident II, the new.

(Mr Peters) I do not know again. Ian, you had better say something about this.

(Rear Admiral Pirnie) I think it is worth pointing out the difference between our classes of submarine as between ourselves and the Americans. The Americans are essentially deploying Trident II in the same hull and class of submarine as they have been deploying Trident I, whereas our submarine is a new submarine in every regard. It has a new propulsion plant, it has a new tactical weapon system at the forward end of the submarine, command and control system, and, of course, for us it has a new strategic weapons system. It is, therefore, a submarine that has all new equipment throughout and one would, therefore, anticipate the trials would be commensurately longer. The actual length of time we spend on trials and the dates of trials carry a similar classification on security grounds as do other operational dates.

Chairman: We have come to the end of the public part and I will suspend the sitting for a very brief moment whilst the press and public leave us. Perhaps it will help if I say we will not be sitting in public again today.

Evidence Heard in Private

Chairman

130. I have a few questions about the Polaris rocket motors. Your answer 50 suggested * * *. How many and what proportion does that represent?

(Mr Peters) I am sorry, I do not know the answer to that in number and proportion terms. I will have to give you a note.

131. How do you know that you are able to deploy motors * * *. Do you know that from the United States tests?

(Mr Peters) We know it, I think, mainly because there are regular test procedures * * *.

(Rear Admiral Pirnie) * * *. Does that help sufficiently?

132. Are you satisfied that the next test firing of Polaris * * * is soon enough for your purposes?

(Rear Admiral Pirnie) Indeed.

133. When was the last one?

(Rear Admiral Pirnie) May 1987.

134. Is that a longer or shorter interval than you have had in the past?

(Rear Admiral Pirnie) I am afraid I do not have to hand the dates of the preceding tests but if you would like them we will give them to you.¹

135. What particular lessons do you expect to learn from the test firing?

(Rear Admiral Pirnie) Any submarine test firing continues to give us confidence in the reliability and performance of both the strategic weapon system, the missile, and, indeed, in the crews.

136. Do you want to go any further than that? Do you go into a specific test firing and say, "Out of this we would like to learn a particular thing"?

(Rear Admiral Pirnie) There are occasions on which a particular facet might be looked at more closely than another but in general terms at this stage of the Polaris Chevaline programme we are renewing confidence all the time.

137. You are pretty sure it works?

(Rear Admiral Pirnie) We understand the performance and we are monitoring it.

Mr Wilkinson

138. Just on the question of motor reliability, from your answer to question 49 it would seem that over the last five years just over * * *. Do you feel that now that the weapon is out of service in the United States Navy and you do not have their test data that you ought not to be increasing the rate of testing in the UK?

(Rear Admiral Pirnie) I think the figure given of * * * (and, as you recognise, that is a classified figure) implies a fairly rigorous statement of saying it was a failure. If you were on the receiving end of this weapon you would not have thought that there were * * * failures. It was * * * failures to achieve the totality of the performance specification. I think probably in the terms that you are considering it, ie, * * *, the figure would be nearer * * *. If I could answer your question about should we do further firings, one has always in the balance—as clearly we have—to conserve our stocks of missiles so that we do not run out, and therefore one is judging test-firing and the numbers of test-firings you do against what confidence levels you feel you need to achieve.

139. If there is any slippage in Trident you would need to test even less?

(Rear Admiral Pirnie) There will not be a slippage in Trident.

Chairman

140. That is the best news all morning. Mr Sayeed asked about the exact details of in-production dates of the A90 building which you said you would prefer to answer in private.

(Mr Maberley) I indicated to the Committee earlier that the building would be ready with its processing equipment in mid-1990. At that point we would start commissioning, initially with non-radio-active material and then with radio-active material. We expect to introduce radio-active material into the facility by mid-1991, we expect that material to be of full production quality by early 1992, and we expect the first output from A90 in * * * 1992.

Mr Sayeed

141. Thank you. * * * 1992.

(Mr Maberley) Yes.

¹Evidence, p. 35(i).

30th March 1988]

MR J PETERS, CB, REAR ADMIRAL I H PIRNIE,
MR J MABBERLEY and MR B DAY, CB

[Continued

[Mr Sayeed Contd]

142. What latitude do you have, therefore, before any slippage would start interfering and affecting the in-service date of Trident submarines?

(Mr Maberley) We have a few months in that 1992 date. In other words, we would expect—and, indeed, should have—that production within a few months of * * * 1992. But I must say, in offering that answer, that there is sensible contingency within the programme prior to the actual production run of material which will end up with a produced warhead in * * * 1992. In other words, I would not wish to give the impression to the Committee that in a programme that stretches over six or seven years we had only a few months' contingency. We have a few months' contingency in that date but we have several other areas of contingency in the build-up process.

143. If it was delayed by six months (it did not come in in * * *, it was six months later) you would have used up part of your other contingency—or a good deal of it—which you operate into the other areas. That would, or could, therefore, affect the in-service date of Trident. What is the maximum delay in the production time which would then use up any other contingency which you have allowed for, and therefore would delay the in-service date of Trident?

(Mr Maberley) I think I would have to offer you a note on that. Otherwise I could mislead you by recording a figure accurately.¹

Sir Barney Hayhoe

144. Perhaps this is more a question for the Admiral, but which is the most critical point of the whole programme? Is it the one we are talking of now, with the commissioning and full operation of A90 and material going through, or are there other points which have been identified as most critical in achieving the in-service date that you have set?

¹Evidence, p. 35(j).

(Rear Admiral Pirnie) I think in terms, as you have heard, of the in-service date of the first submarine, A90 is not the critical factor.

Chairman

145. Which is the critical factor?

(Mr Peters) As in any complex programme like this there are critical factors that crop up here and there as you go along. The whole of the management control arrangements are designed to spot this and turn them into uncritical factors. We have up to now, because that was appropriate for the programme up to this stage, used the milestone system, with which I think you are familiar, which, as a result of the regular reviewing process, has always identified what has to be done when and, therefore, to make sure it can be done. From later this year we will be having, I think, a network path analysis system which will convert the milestones into a huge number of events, all of which have to be met at a particular time. Then, as in any other set system, it will no doubt be flashing lights here and there as it goes along.

146. You do not think the lights will flash over the warhead?

(Rear Admiral Pirnie) I think it is fair to say this, Chairman, that there is no dominant problem that stands put in the way that you have been seeking.

Chairman: Thank you. That comes to the end of what has, I think, been a very useful session, Mr. Peters. In thanking you all for your answers to our questions can I wish you a happy and peaceful Easter and may I also ask you to leave as quickly as you can so that we can have our short private session.

APPENDICES TO THE MINUTES OF EVIDENCE

REPORT BY THE SECRETARY OF STATE FOR DEFENCE, 21 JANUARY 1988

1. The programme to replace Polaris with Trident in the mid 1990s remains on schedule with all areas building up to a high level of activity.

Submarine

2. An order for the construction of SSBN06, HMS VICTORIOUS, the second of the United Kingdom's 4 Trident class submarines, was placed with Vickers Shipbuilding and Engineering Limited on 6 October 1987. The construction of the first two submarines at Barrow is going well. The hulls of both are now under assembly in the new Devonshire Dock Hall where they will be constructed before being put into the water for completion. Trials will then start in the early 1990s. The orders for the next two submarines will be placed progressively.

Strategic Weapon System

3. Excellent progress is also being made in the US with the development and testing of the new Trident D5 missile. Since early 1987 there have been a number of completely successful test firings. So far these have been from a ground launch pad but test firings from submarines are due to start in February 1989. The US authorities keep us well informed about the results of these tests.

Tactical Weapon System

4. The development programmes for the major items of weapon equipment have now consolidated and progress has been satisfactory. The risk involved in bringing together the many diverse equipments to function as a system will be minimised by the integration work to be undertaken in the shore development facility at VSEL Barrow. Production programmes are well established for the Sonar suite, command system and the weapon handling system. The first production contract for the self protection system will be placed early in the new financial year. Significant savings have been made in the cost of this equipment by the adoption of later technology. Overall, the tactical weapon system is meeting its required programme.

Warhead

5. Last year's report by the Comptroller and Auditor General highlighted a number of problems in the building works programme at AWE Aldermaston where the new warhead for Trident missiles has been designed. Measures were already in hand to improve the situation and, despite this area of reported difficulty, the in-service date for the UK Trident systems remains the mid 1990s.

Works

6. The last year has also seen further advances in the building programmes at the Clyde submarine Base in Scotland where the VANGUARD class submarines will be based. This construction programme is currently among the largest in the UK, and it is in line with the planned timetable. In the past year asbestos clearance from the Faslane site area has been completed, as has a large programme of site preparation at RNAD Coulport. New roads, which are part of the programme, are progressively being opened for use and these will relieve pressures from construction traffic on the towns and villages in the area. A number of large contracts have been let; including those for a Shiplift for docking submarines and a Generating Station. Tenders have been invited for a Floating Jetty at RNAD Coulport and a start has been made on the preliminary work for the refitting facility at Rosyth where, in the future, VANGUARD class submarines will be refitted and refueled.

Jobs

7. It is assessed that on average the programme will provide over 7,000 direct and over 5,000 indirect jobs over the procurement period with the figures rising to 15,000 direct and 12,000 indirect in the peak years.

UK Industrial Participation in US Trident Programme

8. The development phase of the US programme is now concluded. By the end of September 1987 British firms had won contracts to the value of \$78m. There are opportunities for follow-on orders during the production phase of the programme which has now begun.

Estimate

9. The following Table shows the changes between the previous estimate of £9,265m and the current estimate of £9,043m. The proportion of the Defence Budget which the Trident programme takes over its procurement period is now less than 3 per cent on average.

	US £m	(\$m)	UK £m	TOTAL £mM
Previous estimate @ £1 = \$1.50 86-87 prices	3,479	(5,219)	5,786	9,265
Real changes @ £1 = \$1.50 86-87 prices	-108	(-162)	-268	-376
Add price inflation 86-87-87-88	116 (3.4%)	(174)	296 (5.4%)	412
Exchange Rate Variation	-258			-258
Revised Estimate @ £1 = \$1.62 87-88 prices	3,229	(5,231)	5,814	9,043
US/UK Percentage	36%		64%	

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

	1987	1988
Submarine (less weapon system equipment)	31%	33%
Weapon system equipment including Tactical Systems	21%	20%
Missiles	12%	12%
Shore construction	7%	7%
Warhead, Miscellaneous, unallocated contingency, etc	30%	29%

Ministry of Defence, 21 January 1988

ANNEX

Written Answer, Official Report, 21 January 1988, col. 775.

Mr Andrew Mitchell: To ask the Secretary of State for Defence, what is the latest estimate of the cost of the Trident system.

Mr Younger: I am pleased to announce that for the second year running there has been a reduction in the estimated cost of the Trident programme, which now stands at £9,043 million.

After allowing for the effects of inflation and exchange rate variations, there is a real reduction in the estimate over the one announced previously of some £376 million and a real reduction of £1,038 million over the original 1982 estimate, over and above the savings resulting from the decision to have United Kingdom missiles processed in the United States facility at King's Bay, Georgia. The total will be spent over a period of 20 years.

In line with established conventions adopted for the recosting of the defence programme, the estimate is based on the exchange rate used for the long term costing of the defence programme, namely £1-\$1.62.

The proportion of the programme to be undertaken in the United Kingdom has also reached its highest recorded level—64 per cent.

The Select Committee on Defence previously asked that when announcing the annual revised estimate, I should report on the state of the project as a whole. I am pleased to say that the project remains on programme to enter service as planned in the mid-1990s. There has been no slippage in the in-service date since the decision to proceed with Trident II was announced in March 1982. I am, as last year, sending to the Chairmen of the Select Committee on Defence and the Public Accounts Committee a more detailed report covering the points on which the Select Committee on Defence sought advice. I am also placing a copy of the report in the Library of the House.

MEMORANDUM BY THE MINISTRY OF DEFENCE 21 MARCH 1988

Question

Q1.

The Committee wish to have updated versions of the tables in the Report by the Comptroller and Auditor General, *Ministry of Defence and Property Services Agency: Control and Management of the Trident Programme July 1987 (HC 27 of Session 1987-88) on Programme Costs (p. 3), breakdown of costs (p. 14) and effect of exchange rate variations (p. 15).*

Answer

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	1,141	1,749	2,890
Exchange Rate Variation	440	—	440
King's Bay savings (87-88 prices, \$1.62)	-304	-465	-770
Other Real Cost Changes: (87-88 prices, \$1.62)			
(1) Submarines—	-106	-762	-868
(2) Statagic Weapon System (SWS)—Equipment	-359	22	-337
(3) SWS Missiles	-576	-16	-591
(4) Tactical Weapon System (TWS)	3	222	225
(5) Shore Construction	—	337	337
(6) Warhead, Miscellaneous, unallocated contingency	-323	520	197
Current Estimate (87-88 prices, £1.62)	3,229 (36%)	5,814 (64%)	9,043

Note: SWS and TWS equipment separated in this table. Cost are non-hybrid.

b. Breakdown of Costs

	November 1981 Estimate			1981 Estimate less King's Bay			£m Current Estimate		
	September 81 prices; \$1.78			87-88 prices; \$1.62			87-88 prices; \$1.62		
	US	UK	Total	US	UK	Total	US	UK	Total
Submarines	267	2,333	2,600	396	3,444	3,840	290	2,682	2,972
SWS—Equipment	918	74	992	1,316	101	1,417	957	123	1,080
SWS—Missile	1,275	44	-1,319	1,611	32	1,643	1,035	—	1,051
Tactical Weapon System	—	326	326	—	468	468	3	690	693
Shore Construction	—	579	579	—	320	320	—	657	657
Warhead, Miscellaneous and unallocated contingency	853	851	1,704	1,267	1,126	2,393	944	1,646	2,590
Total	3,313 (44%)	4,207 (56%)	7,520	4,590 (46%)	5,491 (54%)	10,081	3,229 (36%)	5,814 (64%)	9,043

Note: All figures non-hybrid.

Explanation of Changes (Totals)

	US	£m UK	Total
November 1981 Estimate (September 81 prices; \$1.78)	3,313	4,207	7,520
Price inflation	1,141	1,749	2,890
Exchange rate inflation	440	—	440
King's Bay Changes	-304	-465	-770
Other Real Cost Changes	-1,361	323	-1,038
Current estimate (87-88 prices; \$1.62)	3,229	5,814	9,043

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

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

		£m Average 87-88 prices					
		1981 Estimate less King's Bay (dollar content \$7,436m)			Current Estimate (dollar content \$5,231m)		
		US	UK	Total	US	UK	Total
(i)	\$/£1	7,436 (58%)	5,491 (42%)	12,927	5,231 (47%)	5,814 (53%)	11,045
(ii)	\$1.25/£1	5,949 (52%)	5,491 (48%)	11,440	4,185 (42%)	5,814 (58%)	9,999
(iii)	\$1.62/£1	4,590 (46%)	5,491 (54%)	10,081	3,229 (36%)	5,814 (64%)	9,043
(iv)	\$1.75/£1	4,249 (44%)	5,491 (56%)	9,740	2,989 (34%)	5,814 (66%)	8,803
(v)	\$2/£1	3,718 (40%)	5,491 (60%)	9,209	2,615 (31%)	5,814 (69%)	8,429

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

A2. Expenditure on *Trident* up to 31 December 1987:

(a) £1,006m in UK (b) £379m in US

Q3. How much has been committed to *Trident* up to the latest available date (a) in the UK and (b) in the US?

A3. Commitment on *Trident* up to 31 December 1987

(a) £2.7 bn in UK (b) £0.8 bn in US

Q4. Since November 1981 (and excluding the shift to King's Bay for refurbishment) what have been the gross increases and reductions in the real costs estimated for both UK and US in:

- (i) Submarines;
- (ii) Strategic Weapon System Missiles;
- (iii) Strategic Weapon System Equipment;
- (iv) Tactical Weapon System;
- (v) Shore Construction;
- (vi) Warhead, miscellaneous and unallocated contingency?

A4. See Answer 1a

Q5. Since the January 1987 estimate what have been the gross increases and reductions in the real costs estimated for both UK and US in:

- (i) Submarines;
- (ii) Strategic Weapon System Missiles;
- (iii) Strategic Weapon System Equipment;
- (iv) Tactical Weapon System;
- (v) Shore Construction;
- (vi) Warhead, miscellaneous and unallocated contingency?

A5.

	US	UK	Total	£m
Submarines	-12	-12	-24	(86-87 prices, (\$1.50))
SWS—Equipment	-34	-26	-60	
SWS—Missile	20	1	22	
Tactical Weapon System	1	-62	-62	
Shore Construction	—	-32	-32	
Warhead, Miscellaneous unallocated contingency	-83	-137	-220	
Total	-108	-268	-376	

Q6. For each of the years 1980-88, what has been the annual expenditure on (a) the *Polaris* force and (b) the *Trident* programme?

A6. £m	<i>Trident</i>	<i>Polaris</i>
1980/81	3	162
1981/82	31	238
1982/83	71	256
1983/84	95	233
1984/85	165	219
1985/86	268	241
1986/87	377	281
1987/88	550 (Estimated)	332

Q7. For each of the years 1980–88 how much of the item *Other Research and Development* has been devoted to strategic nuclear forces, and how much of this has been devoted to *Trident*?

A7.	£m	Other R&D	S.N.F.	Trident
	1980/81	227		
	1981/82	248		
	1982/83	267		
	1983/84	308	*	* *
	1984/85	363		
	1985/86	409		
	1986/87	374		
	1987/88	485		

Q8. How much (to the latest convenient date) has so far been spent on each of SSBN 05, 06, 07, 08?

A8. Expenditure to December 1987 on:

	£m
SSBN 05	312
SSBN 06	68
SSBN 07	26
SSBN 08	37

Note: The expenditure on SSBN 08 reflects the procurement of construction support spares for the VANGUARD class. The intention is that items procured against this heading will ultimately be absorbed into the class build programme and are thus treated in the project accounts as long lead items for SSBN 08.

Q9. What is the contingency allowance for each of the elements of the programme?

A9. Contingency included within each programme element:

	£m
a. Submarine	208
b. Strategic Weapon System	173
c. Tactical Weapon System	43
d. Shore Construction	150
e. Warhead, Miscellaneous, unallocated contingency	677

Q10. What is the unallocated contingency allowance?

A10. £595m.

Q11. What assurances have been received from the United States with regard to the possible effect on the supply of *Trident* missiles to the UK of any future arms control agreement?

A.11 Close contact is maintained with the US government, both at official and Ministerial level, with regard to the items of equipment which the United States is contracted to supply to us under the terms of the agreement covering the purchase of *Trident*. The UK government continues to have every confidence and that the United States' obligations under the agreement will be met in full.

Q12. Is the Ministry satisfied that it will be able to produce software for targetting, modelling and effectiveness assessment? What steps have been taken to recruit extra scientific staff to carry out these tasks?

A12. The MoD is confident that software for targetting, modelling and effectiveness assessment will be produced as required to support the programme. There is at present a shortage of non-industrial scientific disciplines within the project and recruitment efforts continue to be made. Contractors are used as necessary to make good any shortfalls and to ensure that the programme is not affected.

Q13. What offset contracts of value of over £½ million have been let by the US on UK industry under the main headings of the Trident programme; to whom, for what, and for what value? Which firms are British, and which are subsidiaries of US firms?

A13.

		£
<i>Composite Work</i>		
*Fiberite	Graphite Cloth & Tape	1,155,555
†Stanley Aviation	Seals	3,391,975
<i>Electrical Work</i>		
Ferranti Computer	Printed circuit boards	521,051
Hughes Micro Electronics	EA & IMUE modules	1,099,415
Textronic	Electric test models	1,425,651
<i>General Engineering</i>		
Babcock Power	Motor Chock	1,383,559
Babcock Power	Chock mate FWD system	930,247
Babcock Power	Motor Chocks	506,173
GEC Mechanical Handling	Missile erectors	1,125,925
GEC Mechanical Handling	Missile Loading	8,882,099
GEC Mechanical Handling	Fixture	1,404,321
‡HITCO		3,228,151
Newburgh Engineering	Rail car restraint	553,765
Strachan & Henshaw	Cover	690,741
<i>Optical Equipment</i>		
Pilkington PE Ltd	Optical assemblies	3,391,975
*Fiberite—Subsidiary of ICE		
†Stanley Aviation—subsidiary of Flight Refuelling		
‡HITCO—Subsidiary of BP Oil		

Q14. Is there evidence of firms now winning follow-on orders as the US Trident programme moves into higher gear?

A14. There is evidence of UK firms or their subsidiaries winning follow-on orders for the US programme. However a substantial increase in follow-on orders is not expected until about 1990–91.

Q15. What is the estimated development cost for the PWR2 nuclear propulsion unit? How much of this is attributed to the Trident programme?

A.15

* * *

Q16. What is the cost of the propulsion units for the individual SSBNs?

A16. The cost of the propulsion unit (comprising the Nuclear Steam Raising Plant and secondary Propulsion Machinery) is some £70m (at 87–88 prices).

Q17. Paragraph 4 of the Secretary of State's 1988 report on the programme says that "Overall, the tactical weapon system is meeting its required programme". Which parts of the tactical weapons system are failing to meet their planned or required programme?

A17. The principal area of concern for the tactical weapon system (TWS) programme is in the Shore Development Facility (SDF) for which delivery of the Sonar Suite and the Command System are showing signs of slippage. However, this can be contained within the SDF programme contingency and no threat is seen to achieving TWS Fleet Weapon Acceptance in SSBN 05 schedule.

Q18. In paragraph 4 of the report, on tactical weapon system, is there any difference between "satisfactory progress" (as in the development programmes for the major items of weapon equipment) and "well established" (as in production programmes).

A18. The terms "satisfactory progress—on development" and "well established—on production" were used to convey the levels of confidence in these programmes. In the case of the development programme the work had been progressing for many years and the comment on progress was entirely applicable. However, at the time of preparing the report, progress has been made on only the early production aspects of the TWS equipments. Comment was therefore focused on the *commitment* to the production programme where, with the exception of the Self protection mast (SPM) system, production contracts had been placed for a substantial part of the TWS for SSBN 05.

Q19. In 1987 the previous Defence Committee was told that the development and production of the sonar suite for HMS VANGUARD was "progressing satisfactorily". Why did the Ministry make no mention of the delays detailed in the Comptroller and Auditor General's Report (paragraph 3.18)?

A19. The delays reported to the NAO took place mainly during the period between their previous examination in 1983 and their latest in 1987. Looked at cumulatively they may appear to present a less than satisfactory picture. However, as each delay occurred, the necessary management action was taken to contain its effect on the programme. As a result each individual delay did not warrant reference in the annual report to the HCDC.

Q20. The Comptroller and Auditor General's report gives the PSA costs for the building works programme as £75 million. What are the reasons for the size of this sum?

A20. PSA resource costs are made up of fees paid to the consultants for Trident work plus the in-house costs of supervising those consultants. The current estimate of PSA resource costs is £94 million at September 1987 prices: of which about 90 per cent is extramural expenditure on consultants fees. These costs arise 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 a exceptionally large number of contractors on one site.

Q21. What are the cost estimates for the individual construction programmes at (a) Coulport, (b) Faslane; (c) Rosyth and (d) elsewhere; and how much of each is attributable to the Trident programme?

A21. Estimates can be broken down as follows:

	<i>Related</i>	<i>Attributable</i>
(a) Coulport	£222m	£222m
(b) Faslane	£267m	£ 90m
(c) Clyde Submarine Base External Roads and utilities	£ 40m	£ 38m
(d) Rosyth	£214m	£ 51m
(e) Elsewhere	£ 10m	£ 9m
	£753m	£410m

However, to the figure of £410 million must be added contingencies (£150 million and PSA resource costs (£94 million) and £3 million price variation on sunk costs in order to arrive at a total of £657 million (non-hybrid) which reflects the figure of 7 per cent included in the breakdown of Trident costs made available to the House by the Secretary of State on 21 January this year.

Q22. What is the basis for the attribution of costs to the Trident programme when they have wider relevance? Why was this attribution reduced for some projects to a total of £52 million (Comptroller and Auditor General's Report p. 16)? Which projects were involved?

A22. This question does not correctly reflect the statement in C&AG's Report page 16. The report refers to a reduction of £52 million in the proportion of projects attributed to Trident. Some of the construction projects are required solely because of Trident in which case all of the cost is attributed to Trident. Others have a dual application, ie they are needed both for Trident and non-Trident purposes. Where Trident needs to share the use of new or existing facilities any additional costs are attributed to Trident and the extent of such Trident attribution is decided for each element of the programme. Following the 1984 overall review of Trident related works costs, when a baseline budget was set and early broad areas of costs were refined, a similar review was conducted in 1985 which looked at the broad attributions which has been previously set. This review covering 110 individual major works projects was undertaken following which 16 attributions were changed (11 reduced and 5 increased) resulting in the overall reduction in the Trident attributable shore construction programme mentioned in the C&AG's report of some £52 million. The projects changed were as follows:

a. *Faslane*

- (i) Degaussing Terminal Building;
- (ii) Magnetic Treatment Facility;
- (iii) Security measure (5 projects in all);
- (iv) Sea Walls (2 projects in all);
- (v) Asbestos Decontamination and advanced works;
- (vi) Northern Area Roads and Drains.

b. *Rosyth*

- (i) RD57;
- (ii) Storage.

c. *Coulport*

- (i) Explosives Area.
- (ii) Office Extension/Depot HQ.
- (iii) Sewerage Upgrade.

Q23. What is the estimate for the cost of the warhead programme?

A23. * * *

Q24. In the "warhead, miscellaneous and unallocated contingency", to what does "miscellaneous" refer?

A24. Logistic and other support costs, and additional intramural costs.

Q25. Under what heading in Volume 2 of the *Statement on the Defence Estimates* are the costs of the capital works projects at Aldermaston and Burghfield not attributable to *Trident* included?

A25. These costs are included in the *Statement on the Defence Estimates* 1987, Volume 2, as follows:

a. *PSA Buildings and works*

Table 2.4 on page 11—'New work gross total'.

b. *AWE Capital equipment*

Table 3.3 on page 17—'Intramural R&D Capital Plant & Equipment'.

Q26. As the warheads are to be built in the United Kingdom, why is it the case that "Most of the expenditure on development and production (of the warheads) is incurred in the US? (Comptroller and Auditor General's Report, paragraph 3.27).

A26. The warheads are being designed and manufactured in the United Kingdom at the Ministry of Defence nuclear establishments, but the formal Trident programme estimates exclude basic intramural costs (see HC 27 paragraph 1.6). As stated in the Comptroller and Auditor General's Report in Appendix 4, paragraph 3 (HC 27, page 18), the formal warhead programme consists of four major elements: development, production, special (ie fissile) materials and attributable capital. The "development" and "production" elements, covering items such as the costs of the attributable underground tests, and the purchase of elements of the re-entry body and certain warhead related components within it, are mainly incurred in the US. The major item of warhead procurement cost is the special (ie fissile) materials identified by the NAO, most of which is incurred in the UK under the arrangements described in their report. All of the attributable capital element is incurred in the UK.

Q27. What is the "substantial proportion" of the special materials that are purchased in the UK? (Comptroller and Auditor General's Report page 18).

A27. * * *

Q28. What were the "political, economic and employment considerations" which led Ministers to opt for purchase of special materials from British Nuclear Fuels in 1982. Has MoD's view that this option would be "only marginally more expensive" than purchase from the US been confirmed? (Comptroller and Auditor General's Report, page 18).

A28. These considerations were, primarily greater reliance on national sources of supply, employment considerations at BNFL, and the fact that these could be secured at a competitive cost acceptable in terms of both national and defence resources. MoD's view is that the latter is still the case, given the arrangements for purchasing special materials from BNFL on keen terms which the Comptroller and Auditor General's Report found to be satisfactory (HC 27 paragraph 3.27).

Q29. What nuclear tests have been undertaken by or on behalf of HMG since 1 January 1980? How have these been funded?

A29. The United Kingdom, jointly with the United States of America, has conducted 11 nuclear weapons tests since 1980 on the following dates:

26 April 1980

24 October 1980

17 December 1980

12 November 1981

25 April 1982

22 April 1983

1 May 1984

9 December 1984

5 December 1985

25 June 1986

17 July 1987

The costs are borne on Class 1, Vote 2 of the Supply Estimates.

Q30. In 1985 the previous Defence Committee was told that the Trident programme would only be charged a contribution of £24.5 million in respect of works directly attributable to it for the current construction works at Aldermaston and Burghfield, the total cost of which would be £321 million (HC 37-xii of Session 1984-85, Q. 1858). What is the estimate now for the cost of these construction works and how much of this is attributed to the Trident budget?

A30. As reported by the Comptroller and Auditor General (HC 27 Appendix 4, paragraphs 9-11) the capital programme at AWE Aldermaston now comprises a wider programme of 32 projects estimated to cost between £836 million and £1,069 million at Autumn 1985 prices. The element of this cost which is attributable to the Trident programme costing under the convention described by the Comptroller and Auditor General (HC 27, paragraph 1.6) including attributable facilities at AWE Burghfield, is some £50 million.

Q31. During our predecessors' visit to Aldermaston in 1980 they were told that it was hoped to begin production of the warheads for Trident "round about the middle of the eighties, perhaps 1986" and produce them over a period of 8-10 years (HC 36 of Session 1980-81. Qs 944 and 980). When is it now estimated that the production of the Trident workload will begin? What is the delay from the original timetable?

A31. AWE Aldermaston began the production of fissile components in January 1988, as announced by the Secretary of State to Parliament on 23 February 1988. Work has also started at AWE Cardiff on non-fissile components and delivery of warhead-related re-entry body components from the US has begun. This is broadly consistent with the very early indications given to the Committee in 1980 before the decision in March 1982 to purchase Trident II (D5), and will support the delivery of warheads in the planned timescale.

Q32. What are the current shortfalls of staff for (a) all grades; (b) specialists; (c) non-craft industrials; (d) craft industrials? Has there been any increase in wastage rates in recent years?

A32. The position at 1 March 1988 at AWE Aldermaston was as follows:

	Shortfall
Administrative	
Executive and Clerical Grades	111
Specialists	65
Industrials—Craft	40
Industrials—Non Craft	+10

Following the introduction of pay incentives wastage rates stabilised.

Q33. How many personnel have been moved from warhead and related research to production?

A33. Very few, because of the particular skills involved. The overall balance between the various elements in the programme will continue to vary according to the state of the programme and be effected in the main through the processes of recruitment and wastage.

Q34. In January 1986, at a time when it is now clear that the Controller R&D Establishments Research and Nuclear Programmes (CERN) was in the middle of a major review undertaken because of concerns over the delays and cost overruns in the construction programme (Comptroller and Auditor General's Report, pages 18-19) the Committee was told that "Both the development of the nuclear warhead and the construction of the new facilities at Aldermaston and Burghfield to support the programme continue to make satisfactory progress" (HC 399 of Session 1985-86, page 163). Does the Ministry now regard this statement as accurate?

A34. Yes. We consider the programme overall has made and continues to make satisfactory progress. The development programme has gone well for example and component production has started. Other areas of the programme such as the provision of new facilities at AWE have encountered delays and cost increases as described in detail in the Comptroller and Auditor General's Report. Nevertheless our assessment remains that warheads will be available in time for the planned weapons system in-service date.

Q35. What conclusions were reached by John Brown Engineers and Constructors Ltd as a result of their audit of the construction programme at AWE, Aldermaston?

A35. John Brown Engineers and Constructors identified the need for the appointment of an overall management agent to assist the AWE Project Director responsible for the capital programme. The managing agent will have responsibility under the Project Director for managing on his behalf all the individual capital and works contracts necessary to meet the modernisation programme and for coordinating them into an integrated working whole. Competitive tenders for this agent have been sought and it is hoped to appoint the successful contractor shortly.

Q36. What amounts of Trident programme will be, or have already been spent over the following periods (i) in the UK and (ii) in the US: (a) 1980-85; (b) 1985-90; (c) 1990-1995; (d) 1995-2000?

A36. Trident expenditure by period:

	£m	
	UK	US
a. 1980-81 to 1984-85	190	176
b. 1986-86 to 1989-90	2,338	722
c. 1990-91 to 1994-2095	2,344	1,502
d. 1995-96 to 1990-2000	856	821

Note: These total to the *hybrid* project total estimate of £8,948m.

Q37. What is the current estimate for the impact of the Trident programme on the equipment budget on average and at peak years?

A37. Trident should absorb on average less than 6% of the equipment budget over its procurement period. At its peak Trident should absorb less than 11% of the equipment budget.

Q38. When will the peak years of Trident spending occur?

A38. 1989-90 and 1990-91.

Q39. Journalists who were briefed at Coulport in late October were given 1994 as the in-service date for Trident (*Independent* 22 October 1987; *Times* 22 October 1987) as were the lobby correspondents covering Mr Younger's speech at the Conservative Party Conference (*Financial Times* 7 October 1987). Rear Admiral J Slater has been quoted as speaking of full deployment by 1994-95 (*Armed Forces Journal*, August 1987). The Comptroller and Auditor General's report noted that the US Trident system "is due to be operational in the US in late 1989, some five years earlier than in the UK" (para 3.10). Why is the exact in-service date classified?

A39. It is general MoD policy that the exact date upon which a warship becomes operational is classified. It is particularly necessary to disguise as far as possible the programme for trials and working up in order to avoid vessels becoming easy intelligence targets. This is particularly important for first of class vessels.

Q40. What is the amount that the UK will pay to the US as a contribution to the capital cost of jointly used facilities at King's Bay, Georgia, and any additional construction investment costs at King's Bay occasioned solely by United Kingdom missile processing?

A40. (1) £50.0m over 4 years as contribution to the capital cost of jointly used facilities at King's Bay.
(2) £3.5m over 10 years for additional construction cost.

Q41. What is the current estimate for the charge to the UK of the total King's Bay running costs related to the United Kingdom share of the missile processing work load?

A41. The UK share of the total King's Bay running costs is currently estimated at some £9 million per year during the initial outload period. Running costs thereafter are likely to be of a similar order.

Q42. Will each UK SSBN visiting King's Bay prior to its long-refit unload all or just a proportion of its missiles?

A42. UK SSBNs visiting King's Bay prior to entering long-refit will offload all 16 Trident missiles.

Q43. Will the UK maintain any spares for Trident missiles?

A43. The UK will not maintain any complete Trident missiles as spares. However, stocks of spares covering a small range of Trident missile items will be maintained in order to:

- replenish missile onboard repair parts carried by the submarine.
- replace any items as required during missile inspections and testing on the submarine in the Explosives Handling Jetty.

Q44. How many Trident missiles can be housed at Coulport?

A44. It will be possible to store a maximum of 16 missiles at the new Trident extension at RNAD Coulport.

Q45. How many Trident missiles will the UK purchase from the United States?

A45. ★ ★ ★

Q46. What will be the status and authority of the team of US officials to be stationed at Coulport to ensure that the UK maintains quality control in the handling of Trident missiles?

A46. A senior representative of the US Strategic Systems Programme Office may be stationed at RNAD Coulport to provide technical advice and assistance to the UK when the UK so request.

Q47. What is the additional manpower requirement for the Submarine force by the early 1990s? Is the Ministry confident that this can be met?

A47. It is not our practice to give planning projections beyond the PES years, because these do not represent firm commitments formally endorsed by Ministers, as explained in the Secretary of State's letter of 19 June 1984 to the Committee. There will be a substantial increase to cover the parallel running of the Polaris and Trident systems; recruiting and training programmes have for some time been geared to achieving the increase, and we have every confidence that it will be achieved.

Q48. What is the current rate of premature retirements from the submarine service? What measures are being taken to improve matters?

A48. For the calendar year 1987 premature officer retirements were 4.4% of the trained submariner strength, and premature rating retirements were 4.1% of the trained submariner strength. Measures currently being addressed to improve retention include the stabilisation of submarine operating programmes, improvement in sea/shore ratios and working conditions afloat and ashore, and a reduction in enforced separation from families.

Q49. How many UK Polaris missiles have been tested over the past five years? What has been the failure rate? What have been the main causes of failure?

A49. ★ ★ ★

Q50. Is the Ministry aware of any problem relating to the new Polaris rocket motors?

A50. ★ ★ ★

Q51. When is the next test firing of a Polaris to take place?

A51. ★ ★ ★

Q52. Is the Chevaline system now fully operational?

A52. Yes.

Q53. What measures are being taken for its in-service support? Do they involve any outside contractors?

A53. There is a continuous monitoring and assessment of CHEVALINE performance reliability and life.

One US contractor (Atlantic Research Corporation) and a number of UK contractors under the lead of British Aerospace are employed on in-service support of the Chevaline systems.

Q54. How do the support costs of Chevaline compare with those for the Polaris A-3?

A54. Chevaline forms part of the POLARIS A3TK weapons system. Its support costs comprise rather more than one-third of total A3TK support costs.

Q55. What has been the average cost for the third refits of the Polaris SSBNs? How long have they been taking?

A55. Third refits have been carried out to date on HMS RESOLUTION, completed in 1984, and on HMS REPULSE, completed in 1986, and cost respectively, £114M and £117M at outturn prices. They took approximately 2 years to complete.

Q56. What is the estimated cost of a fourth refit for a Polaris SSBN?

A56. No decision has been taken yet on the need for a fourth refit. However, a further major refit would undoubtedly cost more than earlier similar refits. (The programme effects of this would also have significant implications for RN manpower.)

Q57. The Committee wish to have full details of the recent malfunction on board HMS RESOLUTION at Faslane.

A57. ★ ★ ★

Q58. Has a decision yet been taken on the question of a fourth refit? If so, what is the decision?

A58. A decision on a fourth refit for HMS Resolution (SSBNO1) will be taken in June 1988.

Q59. What are the current plans for the modernisation of British (a) battlefield nuclear artillery; (b) Lance missiles; (c) air-launched systems; (d) nuclear depth charges?

A59. As part of the continuing process of reviewing NATO's nuclear force requirements, NATO Defence Ministers at the 1983 Nuclear Planning Group (NPG) meeting in Montebello examined the question of the future size and composition of NATO's theatre nuclear stockpile and agreed both to a reduction of 1,400 warheads from NATO's land based nuclear stockpile in Europe and on the need for improvements to ensure the continuing effectiveness, responsiveness and survivability of remaining systems. SACEUR was tasked to come forward with proposals for implementing this decision and his recommendations were presented to NPG Ministers at their meeting in Luxembourg in March 1985.

The reductions in warheads agreed by Ministers have been completed. Recommendations for improvements are being pursued by SACEUR with the nations concerned, and progress with implementation is being kept under review by the NPG. In broad terms the recommendations include: the deployment of a tactical air to surface missile; the deployment of a follow on to Lance; the introduction of improved nuclear artillery shells; and the continued modernisation of NATO's dual capable aircraft.

The British Army in the Federal Republic of Germany operates four regiments of nuclear capable artillery and one regiment of Lance surface to surface missiles. Nuclear warheads for both systems are supplied by the United States under custodial arrangements. Plans for modernisation in this area will therefore need to be developed in consultation with the US; no decisions affecting British forces have yet been taken.

Other measures called for by SACEUR involve the correction of some maldeployments of nuclear forces and improvements in their effectiveness, survivability and command and control. In this context the UK is withdrawing completely from the 8 in. nuclear artillery role in order to concentrate resources on the 155mm dual-capable gun now in service, as explained by the Secretary of State last year (Official Record, 23 July 1987, column 390).

The UK's independent sub-strategic nuclear capability is currently provided by RN and RAF aircraft armed with UK owned free fall nuclear bombs; additionally the UK operates ship-borne anti-submarine helicopters which can deliver British nuclear depth bombs.

The UK free fall bombs and nuclear depth bombs have been in service for some years now and are expected to reach the end of their useful life towards the end of this century. The British Government is currently considering the requirement for replacing these weapons; in this connection, we have been considering other countries' future weapons development plans. We are in discussion with the French Government and are also taking account of US plans to develop (again, in accord with SACEUR's 1985 proposals for implementing the Montebello decision) a tactical air to surface missile (TASM). A number of options are open to us however and no decisions with regard to a possible replacement for the UK's nuclear free fall bombs have yet been taken.

MEMORANDUM BY THE MINISTRY OF DEFENCE, 11 APRIL 1988

Q1. What changes have been made since 1984 to the management structure at Aldermaston and to the reporting or other relationship between Aldermaston and the MoD headquarters staff? Is any change the result of the experience of the construction programme at Aldermaston?

A1. The Atomic Weapons Research Establishment and the former Royal Ordnance factories at Burghfield and Cardiff were amalgamated into a single Establishment, the Atomic Weapons Establishment (AWE), under a single Director in September 1987. Full details of other changes in management structure at AWE and MoD headquarters, including those resulting from experience of the construction programme at AWE, are given in the Comptroller and Auditor General's report (HC 27, Appendix 4, paragraphs 13 and 14).

Q2. The Ministry's memorandum uses a 1986 range of estimates at Autumn 1985 prices for the capital programme at AWE Aldermaston, and for the Trident attribution. What are the most recent estimates at 1987-88 prices?

A2. After adjustment for inflation to 1987-88 prices, the estimated costs of the wider capital programme at AWE Aldermaston reported by the Comptroller and Auditor General are between £879 million and £1,133 million (hybrid). The latest Trident attribution is £52 million (hybrid).

Q3. The Committee were told that the *Trident* programme would only be charged a small contribution of £24.5 million in respect of works directly attributable to it for the current construction works at the Atomic Weapons Establishments at Aldermaston and Burghfield, the total cost of which would be £321 million. The attribution is now some £50 million, although the total cost has gone up to between £836 million and £1,096 million at Autumn 1985 prices. Why has the attribution to the *Trident* programme not gone up proportionately, especially since many of the problems connected with the capital programme appear to result from the added requirement of *Trident*?

A3. There is no proportional relationship between the Trident attribution and increases in the cost of the general programme of new production and research facilities at AWE. As the Comptroller and Auditor General's report makes clear, the latter were embarked upon before the decision to purchase Trident and are "required for reasons other than Trident but are nevertheless essential to the requirements of the Trident programme" (HC 27, Appendix 4, paragraphs 7 and 8). "The decision to produce the Trident system called for increased production capacity i.e. the capital items charged to the Trident programme". (HC27, Appendix 4, paragraph 9).

Q4. Have any problems been experienced with the capital programme at AWE Burghfield? What is the cost of this programme and how much is attributed to *Trident*?

A4. There is a rolling programme of some £5 million a year on average to refurbish and improve the equipment and facilities at AWE Burghfield in order to maintain a safe and effective future production capability. There are no major problems with this programme. Some £17 million of the cost is included within the Trident capital cost attribution of £52 million in accordance with previously stated conventions.

Q5. The Ministry's answer to Q5 of the Memorandum of 21 March says: "The warheads are being designed and manufactured in the United Kingdom at the Ministry of Defence nuclear establishments, but the formal Trident programme estimates exclude basic intramural costs." What are these costs?

A5. The formal Trident warhead costing does not include basic intramural costs (see Comptroller and Auditor General's Report HC27 paragraph 1.6). The annual cost of operating and maintaining AWE is given below, at Answer 6.

Q6. What is the annual cost of operating and maintaining Ministry of Defence nuclear establishments?

A6. * * * *

Q7. Please define hybridity as used in the Ministry's memorandum. Why is the hybrid total estimate of £8,948 million lower than the non-hybrid estimate of £9,043 million?

A7. A hybrid estimate is one where all sunk costs are expressed at the price level (and exchange rate) at which expenditure occurred. All future costs are expressed at a single current price level (and exchange rate).

The hybrid estimate of £8,948 million is lower than the non-hybrid estimate of £9,048 million because the former is calculated according to the formula set out above, whilst sunk costs as well as future costs in the non-hybrid estimate are revalued at 1987-88 price levels and exchange rates.

Q8. In Table A1(b) there appears to be a figure missing for SWS missile/UK/current estimate. Is it 16?

A8. Yes.

Q9. The Committee are grateful for details of contracts of over £½ million which have been let under the main headings of the US *Trident* programme, but would be grateful if the picture could be completed with similar information for the UK programme.

A9. DESCRIPTION COMPANY VALUE £m

1. WORKS

Coulport

Advance Works	Tarmac Construction (British)	*
Explosives Area	Tarmac Construction (British)	*
Jetty Shore Area and Associated Road	Tarmac Construction (British)	*
Power Station and M&E package	Hawker Siddeley Power Engineering (British)	*
Sewerage Upgrade	Balfour Beatty (British)	*
Eastern Boundary Fence	Cementation Construction Ltd (British)	*

Faslane

Asbestos Decontamination	Tarmac Construction Ltd (British)	*
North and South Fences	Tarmac Construction Ltd (British)	*
Shiplift	Cementation Construction Ltd (British)	*
Site Services Distribution (Pt)	A. Monk & Co. (British)	*
Site Services Distribution (Pt)	Edmund Nuttall (British)	*
Trident Training Feasibility	A. McAlpine (British)	*
N. Entrance Works	N. N. West Holst (Southall) Ltd (British)	*
PIDS	Shorrock Security Systems Ltd (British)	*
GPSS	A. Monk & Co. (British)	*
Check Test Facility	Stangers (British)	*

CSB Faslane External

Northern Access Road	Miller Construction (British)	*
33Kv Supply	Hawker Siddeley Power Engineering (British)	*
Garelochhead By Pass	Miller Construction (British)	*
SRC Reservoir	R. J. Macland (British)	*
Glen Fruin Road	Balfour Beatty (British)	*

Elsewhere

HMS Dolphin	Fisher mod-Lewis Thompson (British)	*
HMS Dolphin	Fisher/MacKenzie Development	*
	Wimpey Construction (British)	*
1153	Balfour Beatty (British)	*

2. TACTICAL WEAPON SYSTEM

Co-ordinating Systems Design Agency	VSEL	*
Project Support	Plessey/Ferranti	*
Project Support	Plessey/Ferranti	*
Shore Development Facility Services	VSEL	*
Scenario Software Development	VSEL	*
TETA Development	Ferranti	*
TETA Development	Ferranti	*
WHDS Development	Strachan & Henshaw	*
ECLSS Development	Strachan & Henshaw	*
Production Contracts for various aspects of WHDS for SSBN 05 and 06	Strachan & Henshaw	*
Project Definition	Plessey	*
2054 Database	Plessey	*
2054 Initial Development	Plessey	*
2054 Development & Preproduction	Plessey	*
2054 First Production	Plessey	*
2054 Second Production	Plessey	*
Project Support	Plessey	*
Project Definition of SPM	Barr & Stroud	*
Full Development of SPM	Barr & Stroud	*

A9. (Continued)

<i>DESCRIPTION</i>	<i>COMPANY</i>	<i>VALUE £m</i>
SPM Long Leads procurement	Barr & Stroud	*
ESM Equipment	Barr & Stroud	*
SSC(S) Production	Marconi	*
VLF/CFD Receivers	Plessey	*
ALK 7 Development	Lucas Bradley	*
Design/Development/Production PDM 4	Thorn EMI	*
Development TSNAPS	Smiths	*
Production TSNAPS	Smiths	*
DCC Development	Ferranti	*
SMCS Development	GCAP	*
Datebase Development	VSEL	*
SMCS Production	GCAP	*
Database Production	VSEL	*

3. *SUBMARINE*

FOC	VSEL	*
05 Build	VSEL	*
06 Build	VSEL	*
05 SSI	VSEL	*
05 NSRP	VSEL	*
06 SSI	VSEL	*
06 NSRP	VSEL	*
07 SSI	VSEL	*
07 NSRP	VSEL	*
CSS SSI	VSEL	*
CSS NSRP	VSEL	*
08 SSI	VSEL	*
Design Agency Services	VSEL	*
06-08 Missile Tubes	VSEL	*
Core G2 (05)	RR&A	*
Core G3 (06)	RR&A	*
Air Bottles	T. I. Chesterfield	*
Safety Work	UKAEA	*
Direct Contract	GDEB	*
Insurance Support Spares	VSEL	*
Configuration Management Supt	VSEL	*
Spare Gear	VSEL	*
UKTTF	Marconi	*
Initial Provision of Spare Gear	RR&A	*
PWR2 Support	RR&A	*
Periscope Shroud	Plessey	*
Hover & Missile Comp	Ferranti	*

4. *SUPPORT*

Environmental Hazard and Detection System at RNAD Coulport	Plessey	*
Sonar 2054	Plessey	*
Submarine Command System	Gresham Capp	*

5. *STRATEGIC WEAPON SYSTEM*

Procurement & Maintenance INTERIM Software	Digitized Equipment Co Ltd	*
Support to Pre-control Guidance	MSRS	*
Support Navigation	BAe	*
Performance Modelling	BAe	*
Operation of Calibration Laboratory	VSEL	*
Trident Support—Launcher	VSEL	*
Co-ordination Contract for DSS	Computer Sciences Ltd	*
Project definition of Trident	Computer Sciences Ltd	*
System Integration	VITS	*

A9. (Continued)

<i>DESCRIPTION</i>	<i>COMPANY</i>	<i>VALUE £m</i>
System Integration	VITS	*
System Integration	VITS	*
System Integration	VITS	*
System Integration	VITS	*
Launcher	West	*
Launcher	West	*
Fire Control	Naval Surface Weapons Centre	*
Fire Control	GEOS	*
Fire Control	GEOS	*
Fire Control	GEOS	*
Fire Control	GEOS	*
Navigation	Naval Weapons Support Centre	*
Navigation	Sperry	*
Navigation	Sperry	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Training	CDC	*
Training	CDC	*
Training	GEOS	*
Training	GEOS	*
Missile	LMSC	*
Missile	LMSC	*
Logistics	CNSW	*
System Integration	VITS	*
Launcher	West	*
Launcher	West	*
Fire Control	GEOS	*
Fire Control	GEOS	*
Navigation	Sperry	*
Navigation	Sperry	*
Missile	LMSC	*
Training	GEOS	*
Training	MTA	*
Training	West	*
System Integration	VITS	*
Launcher	West	*
Launcher	West	*
Launcher	West	*
Fire Control	GEOS	*
Fire Control	NSWC	*
Fire Control	GEOS	*
Navigation	NA	*
Navigation	Sperry	*
Navigation	Sperry	*
Navigation	NA	*
Navigation	Sperry	*
Navigation	NA	*
Navigation	Sperry	*
Navigation	Sperry	*
Navigation	Sperry	*
Test Instrumentation	IEC	*
Test Instrumentation	IEC	*
Missile	LMSC	*
Missile	LMSC	*

A9. (Continued)

<i>DESCRIPTION</i>	<i>COMPANY</i>	<i>VALUE £m</i>
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Missile	LMSC	*
Training	GEOS	*
Training	GEOS	*
Training	West	*
Training	GEOS	*
Training	Sperry	*
Training	LMSC	*
Training	West	*
Training	West	*
Training	CNSW	*
Training	GEOS	*
Training	LMSC	*
Training	NA	*
Training	Sperry	*
Training	GEOS	*
Training	Sperry	*
Training	West	*
Training	LMSC	*
Navigation	Sperry	*
Navigation	NA	*
Training	NA	*
Training	Sperry	*
Missile	LMSC	*
Launcher	West	*
Fire Control	CNSW	*
Fire Control	NSWC	*
Fire Control	CNSW	*
Test Instrumentation	IEC	*
Ship Installation & Design	BAHI	*
Ship Installation & Design	GDEB	*
Ship Installation & Design	NSEA	*
Ship Installation & Design	VITS	*
Ship Installation & Design	VITS	*
Ship Installation & Design	VITS	*
Ship Installation & Design	VITS	*
Ship Installation & Design	VITS	*
Ship Installation & Design	NSEA	*
Ship Installation & Design	GDEB	*
Ship Installation & Design	VITS	*
Ship Installation & Design	VITS	*
Fire Control	RAY	*
Fire Control	SKD	*
Missile	LMSC	*
Fire Control	HI	*
Missile	LMSC	*

KEY:

- VITS—Automation Industries Inc.
 WEST—Westinghouse Electric Corporation
 GEOS—General Electric Co. Ordnance System
 LMSC—Lockheed Missile and Space Company
 CDC—Control Data Corporation Aerospace
 SPERRY—Sperry Corporation
 CNSW—Naval Weapons Support Centre
 NSWC—Naval Surface Weapons Centre
 NA—Rockwell International Corp.
 IEC—Interstate Electric Corporation
 BAHI—Booz, Allen & Hamilton Inc.
 GDEB—General Dynamics Corporation Electric Boat.
 NSEA—Naval Sea Systems Command

A9. (Continued)

KEY (Continued):

RAY—Raytheon Company

SKD—Singer Company

HI—Honeywell Incorp.

DOE—Department of Energy

DNA—Defence Nuclear Agency Field Command

* * *

Q10. The Committee would like to have a reworking of the Table in A6 in constant 1987-88 prices.

A10.	TRIDENT	£m	POLARIS
1980-81	5		270
1981-82	48		369
1982-83	94		339
1983-84	112		275
1984-85	175		232
1985-86	281		253
1986-87	391		291
1987-88	550 (Estimated)		332

Ministry of Defence
11th April 1988

MEMORANDUM BY THE MINISTRY OF DEFENCE, 19 APRIL 1988

Q. (a) What categories of personnel are needed for the full operation of the A90 facility, and in which of these categories is there a shortfall?

A. (a) The full operation of the A90 facility will require staff in the Senior Science and Professional (SSP), other Non-Industrial (ONI) and Industrial (both craft and non-craft) categories. The SSP and ONI staff will be engaged in Electrical, Mechanical, Electronic, Instrumentation, Health Physics, Inspection and Material Recovery work; the craft and non-craft grades will be engaged in Electrical, Electronics and Mechanical Fitting, Pipe Fitting, Instrument Mechanics, Painting, Lathe and Mill work, Joining and Assembly, and Material Recovery. Information on the scale of current shortfalls has been provided already to the Committee in written and oral evidence. Within these numbers there are particular shortfalls in Electrical, Electronics and Mechanical Engineers, Health Physicists and Material Science specialists; there are also shortages in Electricians, Electronics, Mechanics, Fitters, Instrument Makers, Millers and Painters in the craft industrial workforce.

Q. (b) Mr Mabberley suggested that the difference between the pay of a typical craft worker in the Aldermaston area and the pay which could be offered to the same worker by AWE might be "more than £1,000". The Committee would be grateful for some further information on this point, giving pay rates for examples of those categories in shortage at AWE, compared with typical pay rates for such personnel employed elsewhere in the Aldermaston area.

A. (b) Information from local Job Centres indicates that the basic rate of pay in the areas surrounding Aldermaston, for skilled craftsmen, is in the range of £150–£230 per week. This compares with AWE, where the basic rate (ie excluding overtime, bonuses etc) is £130 per week. Thus, as indicated by Mr Mabberley, the evidence suggests the gap on basic rates is at least £20 per week (or £1,000 a year) or more.

Q. (c) The Committee were concerned that the witnesses would give no estimate for the additional number of manpower required for the submarine service by the early 1990s, particularly as the Ministry's Memorandum indicated that recruiting and training programmes had for some time been geared to achieving the increase needed. They have noted Admiral Pirnie's evidence that the increase will not be a permanent one, but nevertheless wish to know what is the Ministry's *present estimate* of the requirement, regardless of whether that yet represents a commitment endorsed by Ministers.

A. (c) Ministers have not yet agreed on precise manpower numbers for the period in question, but we presently estimate that the peak requirement to cover parallel running of both Trident and Polaris might be around 800 people.

Q. (d) Following paragraph (c) above, the Committee wish to have the Ministry's estimate of roughly what increase in non-volunteers will be necessary to achieve required manpower levels.

A. (d) Currently around half the ratings entering the submarine service are volunteers, and 80% of all those serving are volunteers for further service. Virtually all officers are volunteers. We have no reason to believe that these proportions will vary significantly with any increase in overall submarine manpower over the next few years.

Q. (e) On the question of a possible fourth refit for HMS RESOLUTION, the Committee wish to have a rough estimate for the cost of such a refit (i) in financial year 1989–90 and (ii) in financial year 1992/93. They appreciate the point made by witnesses that there are a number of options for the extent of such a refit, should one prove necessary, but for the purposes of comparison would like an estimate on the basis of a refit comparable to those already undergone by *Polaris* boats.

A. (e) On the basis of class data for third refits, making allowance for the relative age of the boat, and excluding any updating of capability, the costs (at FY 88/89 prices) are broadly estimated at £102M for a two year refit starting in 1989/90, and £104M starting in 1992/93.

Q. (f) The Committee would like to know whether there has been any contact with the management of Rosyth Dockyard about the possibility of a fourth refit and its effect on Rosyth's programme; and what views have been put to the MoD by the management of Rosyth.

A. (f) There have been no discussions to date with Babcock Thorn Ltd. The company inter alia will be fully consulted on the implications for the programme, before any decision is taken to undertake a fourth refit.

Q. (g) How many SSNs and SSBNs does the Ministry estimate will be non-operational (whether decommissioned or not) by the year 2000?

A. (g) On current plans, a total of 10 SSNs and SSBNs will have been taken out of service by the year 2000.

Q. (h) The Committee were concerned at the evidence given about the state of the Ministry's thinking on the decommissioning of nuclear submarines. They have therefore asked for a note to supplement the oral evidence, setting out the present situation. In particular, they wish to have an indication of the likely timing of the consideration of this matter within the Ministry and the likely timescale for taking decisions. They also wish to know the level and nature of contact between the MoD, other Government Departments and other authorities involved in nuclear safety and reactor decommissioning; the quantity of nuclear material involved in each vessel and the levels of radiation that may be expected; whether any site for decommissioning has yet been identified; and if not, when it is expected that it will be.

A. (h) 1. The Royal Navy's first nuclear powered submarine, DREADNOUGHT, came out of service in 1982. The uranium fuel was removed from its nuclear reactor and it was taken to Rosyth Naval Base to await a decision on its eventual disposal. A further nine nuclear submarines are planned to come out of service by the year 2000.

2. Like DREADNOUGHT, all of these nuclear submarines will be defuelled at the end of their operational lives. The radioactive material which will remain is almost entirely in the metal components of the reactor machinery (the primary plant) and the structure of the reactor compartment itself. This radioactivity is created by neutrons produced in the reactor during its operational life. As a result some of the elements in the steel become "activated" but remain structurally part of the steel. Iron 55, Cobalt 60 and Nickel 63 are the principal radionuclides. The reactor compartment is classified as 'short-lived' intermediate level waste.

3. At the time of its decommissioning, MoD thinking had been that DREADNOUGHT, defuelled, would be disposed of by sinking it in the Atlantic in the site licensed by the Nuclear Energy Agency of the OECD for the disposal of nuclear waste. The position of the UK Government, endorsed by scientific studies, was and remains that sea disposal is a safe and appropriate method of disposing of some types of nuclear waste, including decommissioning wastes. However, Trade Union action in 1983 prevented the annual dump by Britain of civil nuclear waste and international opposition to the practice, articulated through the London Dumping Convention, continues to cast uncertainty on the timing of any resumption of sea dumping. However, sea disposal remains an option for the disposal of decommissioned submarines.

4. Separation of the entire reactor compartment from the fore and aft ends of the submarine for land burial at a site to be developed for this purpose is also an option. This method of disposal has been selected for the US Navy's decommissioned nuclear submarines and two reactor compartments, from the USS PATRICK HENRY and USS SNOOK, have been successfully disposed of at the Hanford Federal Site in Washington State. This disposal method has advantages in maintaining the integrity of the submarine hull as an immensely strong package but requires the development of a coastal site for the purpose. The mildly irradiated primary plant and associated structures within the reactor compartment weigh approximately 850 tons and form a cylinder 10 metres in diameter and 8 metres long. These dimensions do not make it feasible for practical purposes in the UK to transport them over long distances other than by sea. The MoD already has considerable experience of such a transportation operation gained from the move of the prototype of the reactor which will be used to power the Trident submarines, from Barrow-in-Furness to Dounreay in 1985.

5. Piecemeal disposal of reactor compartments is a further option which has been considered. The waste produced would be packaged in drums to the standards demanded by regulatory bodies and stored until a deep disposal facility has been developed by NIREX next century. However this is not a preferred option. It would involve a much higher radiation dose rate for those required to prepare the submarine for disposal than either of the other options. However, as a nuclear operator, MoD is bound by the Ionising Radiation Regulations which require doses to its workforce to be kept As Low As Reasonably Achievable (the ALARA principle). This option would be contrary to that principle. It would also have a serious effect on the refitting of operational nuclear submarines because of the length of time and piecemeal disposal operation would take, and the large number of Dockyard staff who would use up their annual dose allowances on such an operation and the very great expense, even if practical, of maintaining such a workforce.

6. The MoD has regular contacts with the Departments of Environment and Energy, the Ministry of Agriculture and the Scottish Office on questions related to the disposal of submarine reactor compartments. The MoD also has regular contacts with the Nuclear Installations Inspectorate (NII) and Her Majesty's Industrial Pollution Inspectorate (HMIPI) in Scotland on nuclear waste disposal matters including those relating to the disposal of submarine reactors. Although not formally bound by statutes governing the disposal of nuclear wastes, the MoD undertakes to abide by the regulations which apply to the civil industry, including being subject to independent inspection. It is the aim of the MoD, so far as possible, to use national facilities provided for the disposal of civil nuclear waste as the disposal route for defence wastes. However, submarine reactor compartments do present special problems because of their size and weight.

7. NIREX holds quarterly meetings with the MoD and other nuclear operators including the CEGB, BNFL and UKAEA to discuss the disposal of nuclear waste. In addition the MoD has had bi-lateral contacts with NIREX since its formation on shallow land burial of nuclear waste and deep disposal.

8. The MoD co-operated closely with NIREX in its search for suitable sites for the shallow land disposal of Low Level and short-lived Intermediate Level nuclear waste. Fulbeck, one of the four sites which NIREX announced in February 1986 that it wished to investigate for possible development, is the property of the MoD. The MoD may have wished to make use of a NIREX shallow land burial site to dispose of nuclear submarine reactor compartments but this would only be practicable if it were a coastal site. Two of the sites NIREX announced for investigation were coastal but it would not have been clear for a few years whether either would have been chosen for development. Therefore the Secretary of State for the Environment announced, when informing Parliament of the sites chosen by NIREX, that the MoD would also be considering the development of a small coastal site on MoD land to take reactor compartments from decommissioned nuclear submarines. In the light of the decision by NIREX not to pursue shallow land burial and, instead, to develop a deep disposal site the MoD has not further pursued this option and no sites have been shortlisted for the shallow land burial of submarine reactor compartments.

9. The options for the disposal of nuclear submarine reactor compartments are under active consideration in the MoD and have been for several years. However the problems to which this subject gives rise, the often changing circumstances in relation to plans for the disposal of nuclear waste generated by the civil industry and the desirability of ensuring that MoD plans are broadly in line with civil practice means that it is not possible to say when a decision on the way forward will be reached. It remains the MoD's intention however that decisions will be taken in good time to ensure adequate and safe disposal or storage of this category of nuclear waste and to prevent unacceptable interference with RN operations.

★

★

★

Q. (i) On what dates have UK *Polaris* missiles been test fired?

A. (i) Over the last five years UK *Polaris* missiles have been test fired on the following dates on submarine firings:

<i>Date</i>	<i>Number of Missiles Fired</i>
Jan 82	1
Feb 82	3
May 83	2
Jun 83	4
May 85	2
Jun 85	1
Jul 86	2
Aug 86	2
Apr 87	2
May 87	2
Total	<u>21</u>

Q. (j) What is assessed to be the maximum period of delay to the full operation of the A90 building before there is an impact on the ISD of *Trident*, or on the ability of a *Trident* boat to operate with the number of warheads HMG considers necessary to constitute an effective deterrent?

A. (j) The use of existing facilities at AWE, with production starting in January this year, puts us in a good position to meet the planned in-service date of *Trident* as an effective deterrent without dependence for these early deliveries on progress with the new production facilities. As indicated in the oral evidence the new facilities are now planned to come into production early in 1992 after an extensive period of installation and commissioning. They will then take over from production in existing facilities, with deliveries of finished components before the end of 1992. There are planned contingencies within this time of several months. For these reasons there is confidence that the number of warheads necessary to constitute an effective deterrent will be available as planned.

Q. (k) Can any estimate be made of the financial implications of reducing the size of the forward section of the Trident submarines, thus allowing the accommodation of three, rather than four decks?

A. (k) Reducing the size of the forward section of VANGUARD Class submarines to allow the accommodation of three rather than four decks would be likely to cost several hundreds of millions of pounds for design and re-work. A more precise answer would need detailed study of the effect not only on VANGUARD submarine design but also on VANGUARD Class support facilities and the Polaris fleet and its support facilities.

The maximum diameter of the VANGUARD Class hull is determined by the diameter of the missile compartment, itself driven by the size of the missile. Having established a maximum diameter, retention of that diameter for as much as the submarine's length as is hydrodynamically desirable maximises the overall efficiency of the design. In the context of any changes the space requirements for equipment and crew accommodation forward would be unaffected and thus to achieve a reduction from four to three decks would necessitate a longer forward section to retain the same deck area and volume. A complete review of the naval architecture of the design would then be necessary. In turn, increasing the hull length could have an effect on the facilities at RD57 Rosyth, the shiplifts at VSEL and CSB and the facilities at RNAD Coulport, all of which are designed to accommodate the existing submarine length.

The scale of submarine redesign and rework would add at least three years to the introduction of Trident.

Q. (l) What is Trident expenditure as a proportion of RN new equipment expenditure estimated to be for each year over the period of procurement of Trident?

A. (l) The table below shows, for the years until 1988/9, expenditure attributable to the Navy and that part of the Navy figure which is Trident-related as percentages of total equipment expenditure. It can be seen that Trident is taking a growing share of a Navy attribution which has itself been increasing. For later years, there is not a Ministerially approved equipment programme allocated between Service areas. However, we anticipate that over its procurement period the cost of Trident will average less than 3% of the Defence budget and less than 6% at its peak:

	79/80	80/1	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9
a. "Navy" share of total equipment expenditure	34	36	37	35	35	36	36	38	40	40
b. Trident-related expenditure included in a.	—	0.03	0.3	0.5	0.6	1.2	1.8	2.7	3.3	6.6

★

★

★

19th April 1988.

MEMORANDUM BY THE MINISTRY OF DEFENCE, 10 MAY 1988

Q1. My letter of 31 March sought figures for the proportion of RN new equipment expenditure accounted for by the *Trident* programme. The answer provided by the Ministry made no distinction between "new" and other equipment expenditure. Is it possible to make this distinction and to supply the Committee with the figures in the form originally sought?

A1. In the Ministry's view, the equipment element of the defence budget cannot meaningfully be divided between "new" and "other" expenditure, because of the difficulties of definition.

Q2. What are the latest conveniently available figures for the number of contracts awarded to British companies, and the number of firms involved? The Committee would like this information in order to update the appropriate Table in last year's Report (HC 356 of Session 1986-87, page xiii). You will appreciate that it is not possible to extract this information from Answer 13 of your original Memorandum.

A2. To the end of 1987, 337 contracts to a value of \$85m had been awarded to 59 British companies.

Q3. Is it possible to make an estimate of the stock value of *Polaris* missiles and spares held at Coulport?

A3. The stock value of all *Polaris* missiles deployed at sea or held at RNAD Coulport plus the value of associated spares is some £620m.

Q4. The Committee were told in evidence that the selection of managing agent at Aldermaston was expected to be announced in April. It would be helpful to have word of this as soon as possible, or news of any slippage, so that the Committee's Report can be up to date.

A4. The thorough evaluation and clarification of competitive tenders which is necessary is taking longer than expected; but good progress has been made and the successful contractor will be appointed as soon as possible.

Ministry of Defence
10th May 1988

HMSO publications are available from:

HMSO Publications Centre

(Mail and telephone orders only)

PO Box 276, London SW8 5DT

Telephone orders (01) 622 3316

General enquiries (01) 211 5656

(queuing system in operation for both numbers)

HMSO Bookshops

49 High Holborn, London, WC1V 6HB (01) 211 5656 (Counter service only)

258 Broad Street, Birmingham, B1 2HE (021) 643 3740

Southey House, 33 Wine Street, Bristol, BS1 2BQ (0272) 264306

9-21 Princess Street, Manchester, M60 8AS (061) 834 7201

80 Chichester Street, Belfast, BT1 4JY (0232) 238451

71 Lothian Road, Edinburgh, EH3 9AZ (031) 228 4181

HMSO's Accredited Agents

(see Yellow Pages)

And through good booksellers