PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT

WEDNESDAY 12 JUNE

AFTERNOON SITTING

Members present:
Mr. Michael Mates, in the Chair.

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

The Committee deliberated.

Draft Report (Royal Navy Submarines), proposed by the Chairman, brought up and read.

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

Paragraphs 1 to 112 read and agreed to.

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

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

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

[Adjourned till Wednesday 19 June at half past Ten o'clock.

LIST OF WITNESSES

Wednesday 30 January 1991 *Page*

Wednesday 17 April 1991 *Page*

LIST OF WRITTEN EVIDENCE

MINUTES OF EVIDENCE

TAKEN BEFORE THE DEFENCE COMMITTEE

WEDNESDAY 30 JANUARY 1991

Asterisks in the oral and written Evidence denote that part or all of a question or answer thereto, or a passage of Evidence has not been reported, at the request of the Ministry of Defence and with the agreement of the Committee.

Members present:

Mr Michael Mates, in the Chair

Mr John Cartwright	Mr John Lee
Mr Bruce George	Mr John McFall
Sir Barney Hayhoe	Mr Jonathan Sayeed
Mr John Home Robertson	Mr Neil Thorne

MR RICHARD MOTTRAM, Deputy Under-Secretary of State (Policy), VICE ADMIRAL SIR JOHN KERR, Chief of Defence Intelligence, MR JOHN OUGHTON, Head of Resources and Programmes (Navy), COMMODORE JEREMY BLACKHAM, Director of Navy Plans, CAPTAIN ALAN WEST, Head of Defence Intelligence (Warsaw Pact) Maritime Air, CAPTAIN RICHARD DUFFIELD, Head of Technical Intelligence (Navy) and MR IAN GRIFFITHS, Head of Defence Intelligence (Industries) Shipbuilding, examined.

Chairman

464. Mr Mottram, gentlemen, good morning and thank you for coming to answer our questions about the whole of the submarine scene. The thrust of our questions, certainly to begin with, is to try and get from you how you perceived the threat as it was, how you perceive it has changed and the threat as it is, if there is one, and how that relates to what seems to us to be decisions taken possibly for other reasons as well to make such a significant reduction in the submarine fleet over a relatively short period of time. If we can tease out the rationale from all of that, then I think we will have made some progress which will certainly help us to understand more what it is that is in the minds of those taking those decisions. Can we start with the basis of the whole thing, the threat? What is the threat and how has it changed?

(Mr Mottram) Could I ask Sir John Kerr to deal with the intelligence-related questions, and I will come in on the policy as you want to probe it?

(Vice Admiral Sir John Kerr) I am obviously very happy to talk to aspects other than submarines and the Soviet Navy. To deal with the submarines: we see a drop in the force level of Soviet submarines, quite a considerable drop, from something in the order of 470 vessels in the early 1980s to the current level of about 320 submarines in service.

* * *

465. Just on that, you said the drop during the 1980s, that of course was all pre-end of the cold war, and was that as it were a reduction in quantity offset against an increase in quality because of the new build? I want to know whether it still is coming off the production line at a very high rate.

(Vice Admiral Sir John Kerr) We are seeing a combination of factors there.

466. So it was not a reduction, in short?

(Vice Admiral Sir John Kerr) May I talk capability first?

467. Yes, of course.

(Vice Admiral Sir John Kerr) We are seeing, first of all, a reduction in numbers for two reasons. Firstly, because they have been paying off, and have been for some time, older submarines and surface ships. Secondly, because the more modern submarines take longer to build,

* * *

468. At the end of the 1980s, given the figures you have just given us, had there been any reduction in threat, or had the increase in capability offset the lack of numbers?

(Vice Admiral Sir John Kerr) I think it is very difficult to balance those two. We are seeing a much greater capability in terms of submarines and we are seeing reduced numbers.

* * *

469. What are they doing with their old submarines?

(Vice Admiral Sir John Kerr) The old conventional submarines?

470. No, the old nuclear ones.

(Vice Admiral Sir John Kerr)

* * *

471. I am sorry, that was a diversion, but it is of interest to the Committee at the present moment because there are other problems, as you know, going on!

(Vice Admiral Sir John Kerr)

* * *

[**Chairman** *Contd*]

472. Are you saying in general terms that there will be roughly the same capability at the end of the century as opposed to threat?

(Vice Admiral Sir John Kerr) If I could pick out what we see their

* * *

473. Lastly, because others will have questions, have you detected any reduction in the rate of build or laying down over the last year to 15 months?

(Vice Admiral Sir John Kerr)

* * *

474. There is no detection of anything being cancelled or moved to the right, which is not unknown in our building programme?

* * *

Mr George

475. Can you offer some observations on any change of deployment policy - the Black Sea, the Mediterranean, anywhere where they have been perceived historically as a threat? Linked to that, when there have been previous crises in the Middle East there has been something of a rush through the Bosphorus. Has there been any change of deployment patterns in the Soviet Navy you may discern as being Gulf-related as opposed to being related to the general background in East-West relations?

(Vice Admiral Sir John Kerr)

* * *

476. There was great interest in 1985 when pictures were taken of the Leonid Brezhnev in the Nikolayev shipyard, and clearly that has been constructed and going on trials, can you give me some information on what is happening to their programme of aircraft carrier production? Secondly, do you think this gives any evidence as to any decline of interest in this element of construction? Thirdly, how are they going to deploy them? Will they be as they suggest, merely for defence of the homeland, or will it have any offensive capability?

(Vice Admiral Sir John Kerr) First of all, the building programme. The first thing to mention is that two of the three carriers which have been built have had their names changed - Tbilisi and Riga were considered inappropriate! The first one is now called Admiral of the Soviet Fleet N.G. Kuznetsov.

* * *

477. They are not restricted by the Montreux Convention?

(Vice Admiral Sir John Kerr) When asked, a Russian I was speaking to some time ago, did mention they could call them through-check cruisers!

* * *

478. You mentioned the Brezhnev and the Tbilisi, and now the Kuznetsov, what has happened to the rest?

(Vice Admiral Sir John Kerr)

* * *

Mr Home Robertson

480. Can you say something about the impact of the change of status of other Warsaw Pact Navies?

* * *

481. A second, ethnic point. I was intrigued by the change in the name of the Soviet ships away from Tbilisi, Riga, Baku and whatever else. Evidently the Soviet homeland can now be seen to be a number of homelands. It would be interesting to understand what impact changes in the Soviet Union may have on their forces. Am I right in thinking the Soviet Navy is largely Russian-built and based?

(Vice Admiral Sir John Kerr) This is a very big area. I will try to contain it to the Navy if I can. I would be very happy to expand it if you would like me to do so. First, all services take conscripts and the policy has been to mix the conscripts from all areas in all units as far as possible.

* * *

482. Are there any important bases in the Baltic Republics or any other areas?

(Vice Admiral Sir John Kerr) The key base in the Baltic is Kaliningrad, and Kaliningrad is an oblast in the Russian Federation, but with direct access by land only from Lithuania and Poland.

* * *

483. In the Russian Federation?

(Vice Admiral Sir John Kerr) In the Russian Federation, and Vladivostok as well.

* * *

Sir Barney Hayhoe

485. Just returning to the point that arose from Bruce George's question about deployment linked with the Gulf, was there some sense of surprise or astonishment that there were no deployments?

* * *

a few ships there bristling with antennae trying to see what was going on?

(Vice Admiral Sir John Kerr)

* * *

Chairman

486. If I were to try to summarise very simply what has taken the last 40 minutes or so,

* * *

Mr McFall

487. Is it too simplistic to say it is more defensive rather than offensive?

* * *

[**Mr McFall** *Contd*]

(Vice Admiral Sir John Kerr) A more balanced Navy.

Chairman: Can we turn to some questions we have about forward defence? Mr Cartwright.

Mr Cartwright

488. We know the strategy of forward defence has been reviewed by NATO. How far do you think that review will be affected, firstly, by the decisions you are currently taking about future levels of the Royal Navy submarines and, secondly, by the assessments you are giving us this morning about the threat posed by the Soviet Navy, particularly by Soviet submarines?

(Vice Admiral Sir John Kerr)

* * *

489. That is very helpful. Thank you.

(Mr Mottram) I think it is quite difficult to answer your question precisely.

* * *

In the case of NATO, we have to go through a number of stages. Firstly, we have to get through thinking through the strategic review,

* * *

and then a further period of discussion of individual concepts of operations,

* * *

The final point I would make is that within forces which have a balance and perform a number of tasks, we can of course still continue to perform a forward maritime strategy

* * *

That is a long answer and I am trying to give you a feel of how I see it.

* * *

490. Do you think as the strategy develops it will still be the role of the Royal Navy in any conflict, at the outbreak of any conflict, to sail north in order to hold the ring until the American battle fleets arrive?

(Mr Mottram) I am a bit cautious about holding the ring because in any future conflict with the Soviet Union, and it is difficult to see how that would come about, we would anticipate a long warning time, so it may well be the United States Navy would have the opportunity to be deployed as well. But certainly we shall have a key role in the Royal Navy in deploying forward.

491.

* * *

(Mr Mottram) We have only three choices. One is to hunt them down, or push them well back. The second is the potential capability against cruise missiles when launched from aircraft, and we would have that capability I think; a look down and shoot down capability. The third thing

* * *

is direct defence in terms of surface-to-air missile capability. Those are the three options.

492. How seriously do you take that threat? How would you assess our ability to defend against it?

(Vice Admiral Sir John Kerr)

* * *

(Mr Mottram) I should also say in relation to nuclear armed cruise missiles, we would intend to deal with them by the structure of NATO's nuclear deterrent.

493. Could I move on to the Soviet ASW capability? How do you assess that, particularly the threat from maritime aircraft and ship-borne helicopters, and in what direction is the Soviet ASW capability moving?

(Captain Duffield)

* * *

Mr Sayeed

494. How good are their sonars, would you assess? Do they use sea bed sonar sensors? Do they have dunkin sonars? How good are they?

(Captain Duffield)

* * *

495.

* * *

496.

* * *

497.

* * *

498.

* * *

Chairman

499. Let us turn now to out of area considerations. How does the growing awareness of the threat in areas outside the North Atlantic impact on our ideas about submarine warfare?

(Mr. Mottram) Our own ideas about submarine warfare? I would have to say, Chairman, that we have not every really structured our own forces to deal with a major threat from the Soviet Union outside European waters. To that extent, the direct impact of the margin we have seen in their deployments out of area, as we would call it, does not have a fundamental impact upon our own policy.

500. I am not talking necessarily about awareness of threat from the Soviet Union.

(Mr. Mottram) Perhaps I misunderstood the question.

(Vice Admiral Sir John Kerr)

* * *

501. The point of coming to this as a subject is that we have focused for the last 45 years totally on the Soviet-Warsaw Pact threat, knowing that on the back of our response to that we could cope with

[Chairman *Contd*]
anything else anywhere in the world by redeployment. Are we now looking at what might threaten our interests out of area more critically? I hope the answer to that is yes.

* * *

502. Does that change any of our thinking about our requirements, our ideas about submarine warfare?
(Vice Admiral Sir John Kerr)

* * *

503. Does it make any difference to our requirements for deploying, for example?
(Mr Mottram) The capability of our own ships to be deployed? Firstly, Chairman, I think we have to be a little bit cautious about the scale of the threat to fundamental British interests outside Europe, on how many occasions in relation to how many countries we might face such a thing. Secondly, in shaping and scaling our own maritime capability, I think the Soviet Union is still, and will for the foreseeable future still be, the most demanding case. So that in so far as we are keeping up technologically, let us say, with the challenge of the Soviet Navy we should be keeping up in relation to every other country. Certainly in the case of the Royal Navy we do still have, and we will maintain after "Options for Change", a capability for widespread deployments.
(Captain West)

* * *

504. What role can UK submarines play in a situation like the Gulf?
(Mr Mottram) The role UK submarines can play in the Gulf is very limited, Chairman.

505. Because of the geography of the Gulf?
(Mr Mottram) Yes.

506. But supposing we were involved without the massive American involvement?
(Mr Mottram) I very much doubt if we would be, Chairman. Even then, I think the role of submarines in that particular area would be limited.
(Vice Admiral Sir John Kerr)

* * *

507. Do you see a useful role for our SSNs in out-of-area surveillance both in ASW and anti-surface ship warfare?
(Mr Mottram) I can certainly think of one contingency where we have deployed SSNs in that role. So the answer to that would be yes.

508. Let us turn to NATO and our allies. On 5th December we raised the issue of whether other NATO navies were reducing their submarine fleet in the way we are proposing to. Can you give us an idea of how, and you touched on it earlier, the US perceive the threat?
(Mr Mottram)

* * *

If I talk about what we might term the US policy community, I think they are focusing on two aspects. One is the intelligence aspect we have talked about, and the other is the changing nature of American and Soviet relations, where even after recent events which are going to have a significant impact, the prognosis looking forward over the next few years is much more positive than would have been the case even two or three years ago. What follows from that is that it is realistic to think even after the Gulf conflict there will be substantial reductions in US forces. I touched on the sort of numbers. In nuclear submarines - and we have no direct information on this because the Americans have not decided themselves - if we thought about * off nuclear submarines I think that is quite plausible.

509. Any thoughts as to how that might be divided up?
(Mr Mottram) I do not think that is a decision which they have taken yet. If we talk about other European countries, the contribution of other European countries on the naval side is fairly limited. I would expect there might be some reduction * * * by the end of the decade, but that would be at the margins probably.

* * *

you have told us NATO are going to make their own decisions, maybe at the end of this year, beginning of next year, as to what naval strategy they want; and you have told us the United States in a year or two will consider reductions and a change in their strategy. So what is the logic of us going ahead with such a drastic reduction in our submarine capability, when all of these things which other people are going to do are in a different timescale? What has driven you to decide that we are going to be absolutely in line with our allies in making unilateral reductions of roughly speaking one-third of our submarine fleet ahead of any NATO strategy, with which we will presumably wish to conform, in a world where nobody else has taken that sort of decision?
(Mr Mottram) I do not think that is quite an accurate summary of what I said, Chairman. If we analyse what the United States has done over the last two years, I can give you a long list of changes to US force levels which have been made.

511. Can you tell me they have reduced their submarine fleet by one-third?
(Mr Mottram) But I have just said I think they will reduce it. What I cannot do, because I am not the spokesman for the US Government, is tell you precisely when, where and how, but I am confident they will.

512. You know when, where and how you are making all the changes, but do you know why? I suspect we do know but we would like you to tell us.
(Mr Mottram) I thought I did this once before, but if you can bear to listen to me drone on again, Chairman, I will do it again. What we did over the last year was make an assessment of two sorts of things which needed to be brought together in all our minds. One was the changing risks of war which we talked about before and the perception of

[**Mr Sayeed** *Contd*]
changing relations between us and the Soviet Union. The other was a more detailed assessment of how we thought Soviet forces might themselves change over the next decade, and, when we were doing this work, we would not do it in isolation from Sir John and his people. That was the background against which we took these decisions, and we came up with the conclusion of what was an appropriate force level for the United Kingdom in the mid-1990s. I would argue, but you can contradict me, Chairman, that now you have had a more detailed insight into our perception of how Soviet forces are going to be reduced

* * *

you can begin to see the rationale of why our own force levels might reduce, recognising our own capabilities will then be improved. So that is the strategic direction we have been moving in.

513. That is a question I want to put straight back to you. Are you saying when we have come down from 18 to 12 our capability will have improved?
(Mr Mottram) No, I am saying when we have gone down from 17, which I think we have, Chairman, to about 12 we will have a smaller number.

* * *

514. I am glad to hear that.
(Mr Mottram) That is not what I am saying. Having decided this was an appropriate force structure for us to aim at for the mid-1990s, we have a question as to the rate at which we run down to that. I have never sought to pretend to the Committee that the rate at which we run down was not influenced by resources; of course it was.

Mr McFall

515. Could I ask if that reduction is harmonious with the reduction in the US levels? In other words, did you consult with the US and were they aware of your strategic decision to reduce? Was that strategic decision in harmony with them?
(Mr Mottram) What we did not do was say to the Americans well in advance of our announcement: "We have 17 SSNs now and we are intending in 1995 to have 12." What we were doing in the earlier part of last year was of course having a number of discussions at a number of levels with the United States, about what we thought were the implications of what was going on and how our forces might respond, and we had a very good idea in general terms about how their plans were developing. So I knew last year that the Americans thought that a sizeable reduction in their defence budget, and with it a sizeable reduction in their force levels, including maritime force levels, was appropriate in the new circumstances. Since the announcement which our Secretary of State made on 25th July, we have had a number of conversations with the United States Government and within NATO, talking about the decisions which we have taken. At no stage has the United States questioned the decisions that we took.

516. But have the senior NATO commanders professed themselves satisfied, content?
(Mr Mottram) Chairman, I think it would be unusual to find a senior NATO commander who was offered the chance to say he was satisfied with the idea that force levels were going to be reduced and he then said "I am indeed satisfied". We have had some very useful conversations with the Supreme Allied Commander Atlantic's staff and, obviously, with the Commander-in-Chief Fleet and his staff. I would not pretend that they are particularly enthusiastic about what we have in mind and I think that one reason why they are not particularly enthusiastic is because they are obviously worried - I recognise why they would be worried - about the rate at which this rundown is being conducted in relation to their perception of risks.

517. Over the years you have been coming to us in various guises---
(Mr Mottram) What a terrible thought for you, Chairman.

518. We shall see who outlasts the other, shall we?---- I have heard you say before how inconvenient it is when our NATO allies take unilateral decisions about their budget, their commitment, their force levels and their tasks.
(Mr Mottram) I cannot believe I ever said that!

519. And how you wished these things could be done collectively by negotiation in consultation. Here is Britain - up to now one of the best partners - doing precisely what you have damned the Germans, the Belgians, the Dutch for doing in the past.
(Mr Mottram) I have never done such a thing, Chairman, but perhaps I could then say that, since the announcement we made on that which Mr King made on 25th July, we have gone through the process of consultation with our NATO allies and that took from July to the end of the year. In that process I would not want to pretend that other countries did not feel that there was a risk that we were out ahead of the game.

* * *

I would not want to keep it from the Committee. There was also a second concern, as I have said, about the rate at which we envisaged doing this and the continued perception on the military side of substantial risks in relation to the Soviet Union. I would share that perception of risks and I think we have seen in the last few weeks obviously some very interesting developments which we have to think about very carefully. At the end of that process, however, there was recognition that what we were proposing to do in our future Alliance contribution was both very much more substantial than most of our European allies and was in terms of the structure we had come up with appropriate for the world that the Alliance as a whole saw emerging by the early to mid-1990s. So in fact I am in a difficult position here because it is not appropriate for me to get into explaining what other countries think about

[**Mr McFall** *Contd*]
things or what the NAT0 authorities think about things - that is not my responsibility - but I can say to you we explained very clearly to the NATO authorities the rationale of what we had done in the form in which Mr King had announced it and said did they understand this rationale and think that the plan we had come up with was broadly correct, or did they think we should balance it in a different way? We have not had any suggestions that it should be balanced in a different way. Does that help?

Mr George

520. Mr Mottram, the "Options for Change" announcement was made at the back end of a euphoric period in East-West relations when there was not much fear of any resurgence of Soviet power, when the Gulf conflict was several weeks away, and most people hoped - with the exception probably of defence manufacturers - that we would be marching towards a new era. The announcement was made at that time, and I am not a cold warrior who wanted to see them temporarily shelved, but the actual developments in the Soviet Union should force us to be rather more cautions than we may have been in July, and events in the Gulf have clearly shown that crises can emerge, as history has shown us, at any possible moment when we do not expect it. Is it not wise in those circumstances to pause and wait to see until the dust has settled and the sand has settled in the Soviet Union and the Gulf before proceeding with precipitate decisions that might be regretted? I am not suggesting that "Options for Change" should be eliminated as a process, merely that it should temporarily be put on one side until such time as we can proceed with a greater degree of realism than we are able to do at the present time.

(Mr Mottram) Perhaps I can make clear, Chairman, that when we did the work on "Options for Change", as I said earlier, we did it in close concert with our colleagues on the intelligence side, and the Foreign Office on the broader political aspects of how the world might develop and so on. I can assure you that the structure we came up with was not a structure that we considered appropriate for what might be termed the sunny uplands, some happy future where we would all live together in peace and tranquillity. What we actually tried to do was to say, given what we knew about the Soviet Union and given actually a slightly pessimistic - or we would have regarded it as realistic - perception about the difficulties the Soviet Union would face in all sorts of ways and the number of ways in which it might develop over the next few years, what was our appropriate defence posture? We did not assume in framing "Options for Change" the Soviet Union was no longer a military problem and no threat in Europe, that we did not have to worry about that any more. That is point number one. We took a realistic tough-minded view about how Soviet policy might develop. So I think it would be true to say, subject to one point which I will come on to, speaking frankly, that the recent developments we have seen lie within the envelope of what we were thinking about when we framed the "Options for Change" proposals. The one area where I would say I think that things have not certainly worked out as I would have hoped is that there is a serious problem about the CFE Treaty of a slightly different character to the one that I have-certainly envisaged.

* * *

The second point I would like to make - and this was made explicitly clear in the announcement made on 25th July - is that we were well aware of the risks outside Europe, that those risks could take on a much more demanding character for all sorts of reasons, and that was one aspect we had to think very clearly about in framing our future force posture. We did not, of course, predict that one week later Iraq would invade Kuwait, but we had in mind countries like Iraq in framing for instance, our approach to future structures. We had in mind the need to think both about Europe and about outside Europe. In other areas of our capability we had that requirement in mind, the need for more flexibility and mobility, because we were worried about these developing threats in areas where our vital interests might be engaged. So again the fact that we are in a war does not take us outside the sort of scenarios we had in mind when we thought about "Options for Change". If I could say one final thing, of course we must think very carefully about what proposals were announced last July and the pace at which they are implemented in light of experience since then, and particularly the experience in the Middle East. I am sure Ministers will do that.

521. We could be in a situation, and this is a dreadful thought, of the CFE Treaty not being ratified, us starting the START agreement at the same time, the Gulf War rolling on, and the Soviet military, bolstered by the effect they have already had, becoming even more powerful and either supplanting President Gorbachev or having a stranglehold on his policies. In those circumstances I have not been convinced by your eloquence, Mr Mottram. Is it not sensible to call a temporary halt for a couple of months to see what happens?

(Mr Mottram) We are not rushing ahead. We have made some force level changes and we have had made them in relation to the submarine forces, and I do not see those being undone. But I think the pace at which we proceed with the wholesale restructuring of our forces under Options for Change is indeed something----

Chairman

522. But the submarine force levels are wholesale, are they not?

(Mr Mottram) What I meant was the whole package. The implementation of the whole package.

523. You are still talking as if they are changes at the margin.

[**Chairman** *Contd*]

(Mr Mottram) No, I am not. The pace at which the whole package is implemented is something which Ministers will need to think about in the light of recent events. We have implemented some Option changes in relation to submarine numbers. I am not pretending they are marginal, and I think it is unrealistic to assume they will be rescinded; for all sorts of reasons they will not be. I think the pace at which they are implemented is something we are thinking about. I think we do face very serious resource problems in the country as a whole, and so I cannot pretend to you that if I mention tomorrow, "We have this little local difficulty" somebody will take his cheque book out and say, "No problem, let's slow the whole thing down."

524. Resource problems are in the drlving seat, are they not?

(Mr Mottram) No, but they are a very important point.

Sir Barney Hayhoe

525. You have said they will not be changed, did you mean they cannot be changed or were you really saying that you are absolutely certain that ministers will not change those decisions?

(Mr Mottram) The decisions which have already been implemented?

526. No, the ones which are rolling forward.

(Mr Mottram) Perhaps I have done as I always tend to do, made a point which I thought was helpful but which is getting me into trouble! What I meant was, I did not want to give you the impression insofar as we paid submarines off, for example, and we have already paid some submarines off, that we were rushing around thinking about rescinding those decisions.

* * *

We are not. However, there are a whole series of decisions yet to come, between now and 1993-94, and I am sure the pace at which those are done, and indeed whether they are fully implemented, are issues which the ministers will be thinking about in the months ahead.

527. Could I think of the Mr Mottrams and Admiral Kerrs who are facing, or could be facing, the Soviet defence committee? What would they be saying in a similar context, looking at what we have been doing and looking at numbers and answering questions from their politicians who are arguing that more resources ought to be diverted to civil use and so on and so forth?

(Mr Mottram) Perhaps Admiral Kerr could start on this? It is a very interesting question.

(Vice Admiral Sir John Kerr)

* * *

Chairman

528. So what's the difference!

(Vice Admiral Sir John Kerr)

* * *

(Mr Mottram) Perhaps I could add two things which John may not necessarily agree with, one on the intelligence side and then one policy point? On the intelligence side, I am sure they say

* * *

So there is quite an interesting asymmetry now which was always there but which is even more marked between the Soviet military industrial complex's power inside that country and the power of the equivalent in the West. What we have to do, I think, is to try in so far as we can

* * *

keep up dialogue with the Soviet military, get them to have a better understanding of what we are like

* * *

to try and break out of this cycle, but I would not be confident that it would be done very readily or in a short time.

529. This is all very interesting to us and we are grateful to you for being as frank as you have been. We have a number of questions left and we would be very reluctant to have you back for another session. Let us see how quickly we can get on. One question on anti-submarine warfare: are you working on an ASW operational concept based more on air and surface ASW - EH101, Nimrods, frigates etc - than on "sub against sub"?

(Mr Mottram) I think there would be a marginal shift. There is obviously going to be a shift in the options for i.e. structure, a slight shift between air assets, surface assets and submarine assets. We still envisage roughly the same concept of operations which each plays. I am not down- playing the role of submarines in anti-submarine warfare.

(Commodore Blackham) I think it is very difficult to address one single aspect of warfare in the fashion you are trying to do. Of course, one cannot divide ASW from any other aspect of warfare, they may well be going simultaneously.

530. I just wondered if there was any change in concentration, given the sharp reduction in resources.

(Commodore Blackham) No, I think one is looking at the various aspects of warfare and the best balance of overall capability to meet them.

531. But with the new threat are you looking at the same operational concept with less resources?

(Commodore Blackham) We are looking at generally the same operational ASW concepts etc. As you have heard from the CDI, the submarine threat is different. You are looking at an overall operational concept.

(Mr Oughton) I think it is quite important to pick up the resource point. In the context of looking at ASW across the board we are considering investment not just in submarines but investment which is

[**Chairman** *Contd*]
going on in the Type 23 towed array programme and the EH101 helicopter. If you take that whole package and look at the investment over the next five or ten years you will see considerable investment in the whole ASW concept.

532. With regard to anti-shipping, how far does your assessment of the "equipment" side of the maritime threat, and the implications of this, anticipate a role for submarines in deterring or attacking surface ships?
(Mr Mottram) We still think they have that role.

533. What is the significance of the Soviet merchant fleet as a potential target for Allied submarines?
(Commodore Blackham) If I understand your question correctly, clearly they are targets our submarines are well qualified to take on, but the strategic significance of that, of course, is very different from the strategic significance of commercial shipping to us.

534. Do the Hydrographical and Intelligence gathering fleets figure in the calculation?
(Commodore Blackham) They are certainly potential targets.
(Mr Mottram) Yes, * * * we would do something about them.

535. As far as anti-shipping is concerned, is it proposed that SSNs should fill this role rather than SSKs?
(Commodoe Blackham) Both kinds of submarine are equipped to fill the role.

536. Is the change desirable? Is not the proportionate cost more for this than SSKs?
(Commodore Blackham) It depends on the circumstances. I think, Mr Chairman, both kinds of submarine have similar weapons capability in this area.

537. Despite the slight difference in cost, is not using SSNs a rather expensive way of going about it?
(Commodore Blackham) SSNs have a range of roles. This ls one which it is not particularly expensive to add to their basic role.

538. Referring to that, when we last took evidence we wanted to know the future areas of tasking envisaged in a greatly diminished SSK fleet. Leaving peacetime tasks aside, Mr Mottram told us that no role had been abandoned. You told us so. How does the changing threat enable you to come down to four SSKs? What are the anticipated wartime tasks? (Mr Mottram) I think their wartime tasks would be a selection of those we have given you in our memorandum, Chairman, in very broad terms. We would not wish to see the four conventionally powered submarines looked at in isolation from the rest of the assets.- we were fighting an anti-submarine warfare battle against the Soviet Union, the rest of the assets we would be putting out into that in, say, the Norwegian Sea. With four conventionally powered submarines the capability they can offer is obviously going to be fairly limited, their contribution would be fairly small to the total ASW battle.

539. Is there any reason to plan for a diminished call on their role in surveillance, reconnaissance and launching of shore parties, and that sort of thing?
(Mr Mottram) Well, their role in that, I think, is something it is difficult to size because it depends on the circumstances of the time. We certainly see a continuing role of that kind, yes.

540. What about offensive and defensive mines?
(Mr Mottram) We see a role of that kind as well, yes.

541. And inshore anti-submarine warfare?
(Mr Mottram) We see a role of that kind, Chairman. You will deduce that they are going to be very busy. I could see the pit that you were digging for me to fall into, Chairman.

542. Surely not!
(Mr Mottram) It is my natural paranoia! Some of these roles are roles which can, of course, be performed by other assets and there will be a trade-off.
(Commodore Blackham) One can overplay the roles of SSKs in shallow waters. The draft difference is 10 to 12 feet between SSK and SSN. The distance that implies is sometimes very small.

543. SSBN protection: in determining overall submarine numbers in peacetime, we are talking about

* * *

What about conventional war?
(Mr Mottram) Where did that calculation come from, Chairman?

544. Someone told us that they were worried about it. On the whole you were talking about the normal deployment being

* * *

(Mr Mottram) I think we would be a bit cautious about that, Chairman.

545. You were very cautions about it the last time.

* * *

(Commodore Blackham)

* * *

(Mr Mottram) Rather more generally - I will ask Commodore Blackham to come in in a second - it is certainly a difficult issue. When we were doing "Options for Change", if I can just sketch out the background very briefly and then ask him to comment, one of the absolutely key tasks we identified

[**Chairman** *Contd*]
from the outset was the need to guarantee the deployment of our Trident force. We looked at that from two directions. We looked at the sort of naval assets in broad terms we needed for a whole range of tasks including contributing to the forward maritime operations,

* * *

We also looked at what might be the requirements in transition to war and war as well as in peace for what I might call closer-in, more direct defence of the SSBNs. The sort of numbers you come up with, that is using these terms not too precisely, is

* * *

But it depends on how the threat unfolds, and how we would deploy them depends how the threat unfolds, and that is one key area we would be looking for all the time.

546. That pre-supposes that there would not be a role for SSKs?
(Mr Mottram) There might be, but we are talking primarily about the provision of nuclear powered submarines.

Mr George

547. When I was in the States, in New York, I spoke to a Congressional specialist on US strategic systems, and he explained to me the grest anxieties that are surrounding the future of their Trident 2 missile programme because of the possible closure of the establishment - is it called Rocky Flats in Wyoming?
(Mr Mottram) Yes.

548. Do you have any anxiety the US may not be able to retain a commonality with the UK in the production of Trident 2? If there is going to be closure of this factory, either because of obsolescence or environmental factors, will this have an impact on the American Trident programme and will there be a spill over from their Trident programme to ours? I am sorry to ask a difficult question.
(Mr Mottram) I can answer it briefly. We have broad commonality with the Trident D2 missile. There are certainly activities in the United States looked at on a regular basis, and we are looking at our own programme on the same basis, at the rate at which we purchase our missiles and they purchase theirs. If we think about nuclear warheads in Trident, the UK warheads are UK designed and manufactured and nothing that is happening in Rocky Flats will affect us.
Mr George: Can I say the Committee will be exploring this more fully, including the status of the Rocky Flats programme, and its future and alternatives.

Chairman

549. I am sure they will, when it is relevant to the inquiry. Finally, these reductions and the rate at which you cut down your submarine force, are they having an effect on our submarine building capability?
(Mr Mottram) The effect at the moment is obviously that with no further conventionally powered submarine orders in prospect, obviously VSEL have taken some decisions about the future of their Cammell Laird facility. If we are talking about nuclear powered submarines----

550. Let us stick with the conventional ones for the moment. Does that mean that if there is no change now for five years, we will have lost the capacity or capability to build conventional powered submarines?
(Mr Mottram) No, it does not, because we could build them elsewhere.

551. Where?
(Mr Mottram) At Barrow, for instance.

552. On the basis we have stopped building nuclear submarines there?
(Mr Mottram) No, not on that basis. Alongside. In fact my colleagues are shouting down my right ear, in a number of other yards.

553. Are you absolutely satisfied we are not damaging our capability to build submarines in the future?
(Mr Mottram) I am satisfied that if VSEL chose to close Cammell Laird, which is a matter for them, that does not mean we would not retain the strategic capability, if we wanted it, to build future conventionally powered submarines.

554. What about SSNs?
(Mr Mottram) We have that capability. We are thinking about the appropriate future level of loading of VSEL but, as I mentioned last time, that is one of the issues we have yet to reach conclusions on.

Sir Barney Hayhoe

555. Do you regard the maintenance of an ability to construct SSNs as a vital national interest?
(Mr Mottram)

* * *

Chairman: Goodness me, a direct answer from Mr Mottram! The Committee had better adjourn! As always, thank you very much for what has for us been a very helpful morning.

MINUTES OF EVIDENCE

TAKEN BEFORE THE DEFENCE COMMITTEE

WEDNESDAY 17 APRIL 1991

Members present:
Mr Michael Mates, in the Chair

Mr John Cartwright	Sir Barney Hayhoe
Mr Churchill	Mr John Home Robertson
Mr Bruce George	

MR ROGER JACKLING CBE, Assistant Under Secretary of State (Programmes), MR MICHAEL MOSS, Assistant Under Secretary of State, (Naval Personnel), MR DAVID HEYHOE, Assistant Under Secretary of State (Fleet Support), MR ALAN CREIGHTON, Chief Underwater Systems Executive, COMMODORE JEREMY BLACKHAM, Director of Navy Plans and Programmes, MR JOHN OUGHTON, Head of Resources and Programmes (Navy), MR DAVID BONNER, Head of Secretariat (Naval Staff), COMMANDER JEFF COLLINS, D5, Directorate Naval Operations and Trade, examined.

Chairman

556. Good morning, Mr Jackling, and gentlemen. Thank you for coming to help us with the inquiry we are looking at as far as applies to the naval submarine fleet. Since the announcement by the Secretary of State last July in the Options for Change and that evidence that you gave us in December and in private in January, have any further decisions been taken on the immediate future of the submarine fleet? Can we perhaps go through one or two specific questions on that. For example, have you taken a decision whether, when and, if so, where to give SWIFTSURE a second refit?

(Mr Jackling) Chairman, no we have not.

557. That decision has not been taken?

(Mr Jackling) No.

558. What about whether to base the Upholder class at HMS DOLPHIN or to move it elsewhere?

(Mr Jackling) Chairman, that is caught up in the wide-ranging and overall review of naval support on which work is still going on and in relation to which Ministers have not yet been given advice by the Department. So again no decisions yet on that specific issue.

559. On what timescale would you expect advice to be given to the Ministers on that?

(Mr Jackling) We would expect - and I know this Committee has had this answer before in relation to other issues - within the next two or three months Ministers would be given comprehensive advice on the possible way forward for naval support and to take decisions thereafter.

560. For a decision before the end of the summer?

(Mr Jackling) Chairman, I cannot really predict, I do not think, the timescale in which Ministers would react to that advice.

561. What are the imperatives that you would be advising. I am not asking for your advice to Ministers but is there a time beyond which it would make life very difficult if decisions are not taken?

(Mr Jackling) Chairman, we have a programme in outline for the implementation of Options and we make assumptions about when and in what timescale certain things will be done and that impacts on the forward programme generally. Obviously if decisions about the support structure for the Royal Navy were delayed too long then the whole timetable would slip to the right.

562. I think I can ask you then what is too long as far as the present timetable you have is concerned. Do you need a decision by, shall we say, July?

(Mr Jackling) No, Chairman I do not think we do. I mean you know that the implementation of Options for Change has already been delayed in some of its particulars by the Gulf War and when the Secretary of State announced in outline his thinking in July of last year he was targeting very much the middle of the decade for the new force structure to be in place and the implication of that is the new support structure is in place too. Having said that, once we are clear on the way forward and we have a plan for implementation the sooner the decisions are taken the better and the sooner the uncertainty is removed and people can know where they stand and where they are going and we can get on with it the better and, of course, the sooner we can make the savings which in the long run we hope will flow from a more rationalised and perhaps more efficient support structure.

563. Is there a cost implication in delaying decisions?

[Chairman *Contd*]

(Mr Jacklin) There would be a cost implication, Chairman, in delaying a decision by years. I think that is fair to say.

564. But not by months?

(Mr Jackling) But not by months, in my judgment. I do not think at the moment we are running up against the stops so far as the timing of decisions is concerned and its relation to the saving of money.

565. Roughly when in your judgment would you start running up against the stops? I am trying to get out of you the sort of timescale you feel is necessary.

(Mr Jackling) I would like to say something categorical, Chairman, but I do not think I can. It does vary according to what bit of the organisation and what element of the programme you are talking about but I think - and I think this would be the Secretary of State's hope also - that decisions within the next 9 months to a year across the whole range of issues on Options for Change - not only confirming the overall force structure but also our plans for change in the support area - that is the sort of time-frame in which I think we would be happy to see the decision.

566. Is that answer just about the naval programmes and naval support?

(Mr Jackling) No, that answer would really apply to the support issues overall.

567. The whole of Options?

(Mr Jackling) My hope would be that we shall have a clear view of the way forward on the support to the new force structure within the next 9 to 12 months.

568. Two more specific questions about the immediate future. Any decision about the future of VALIANT?

(Mr Jackling) No, Chairman. There has been no decision about HMS VALIANT yet. I think the Committee has received evidence on the relationship of the pay-off of some of our older submarines to the force structure towards which we are moving. The timing of those paying-offs is related both to the force structure that we are seeking to achieve and the timing in which we are seeking to do that, and what useful contribution they can make in the medium term. As I think the Committee has been briefed in its visits to commands, VALIANT does have some useful life left in her, there are useful things she can contribute to training in the next couple of years, and that is certainly one of the considerations in reaching a decision about her pay-off, but no decision has been taken yet, Chairman.

569. And COURAGEOUS?

(Mr Jackling) Similarly, no decision has been taken on COURAGEOUS, and similar considerations apply in that case.

Mr George

570. Much has happened since we last met witnesses on the subject of submarines, with the war in the Gulf. Has anything happened by way of observation of the Soviet submarine building programme beyond what we were told in December, which has led you to any reappraisal of the apparent commitment to reduce the number of SSNs to a figure of 16, which I found quite an extraordinarily low figure?

(Mr Jackling) That is the figure for both the SSNs and the SSKs together.

571. Yes, and the SSKs.

(Mr Jackling) I am happy for any of my colleagues to come in on this, but I think the answer to your question is no. In terms of the development of Soviet capabilities, on which you were briefed extensively by Sir John Kerr and Mr Mottram, the apparent emerging threat was consistent with the expectations which informed the original Options work in the early part of last summer. There is nothing which has happened since December on that front, in terms of the information we have about the development of the Soviet capability and information we have about the way in which it is deploying, which has changed that assessment. There has, so far as I know, for example, been no new information about the impact of Soviet economic difficulties on their procurement programme, and conversely there has been no evidence that that programme has accelerated, which I am aware of.

572. But they did produce in 1990 almost as many submarines as we will have. Has that fact not created any additional anxiety within the Ministry of Defence?

(Mr Jackling) Mr George, I think the burden of my answer is that that figure was not a surprise to us, so it was not, as it were, new information. You have been extensively briefed on our expectations for the numbers and capability of Soviet submarines in the future, and the point has been made that obviously in our ASW capabilities we plan to operate with Allies to make a contribution to what is an allied effort, and incremental changes in the number of Soviet submarines have to be seen in that wider context, rather than just in relation to what we plan to do ourselves.

Sir Barney Hayhoe

573. Could I just return to the timetable point which the Chairman was raising a moment ago and the financial implications? You were saying the decisions will probably be made within this financial year, presumably since the Government's spending programmes tend to be determined by October in each year, in the Autumn Statement, there will be therefore no implication for costs in the 1992-93 financial year, and the best that the decisions could reflect into cost would be the following year. Would that be right?

(Mr Jackling) Sir Barney, you are right, of course – you are familiar with our processes. We try to have a pretty clear view by October about what the demands are going to be in the immediately coming financial year. But you will also acknowledge that sometimes events can overtake you – they did this year – and so our expectations in October are not

[**Sir Barney Hayhoe** *Contd*]
necessarily those which mature in April. The other point I would make is that the savings to defence expenditure which will flow from the reduction in force level, and the proportionate reduction in our infastructure to support that force level, tend to be a year, 18 months, two years out. So if one is seeking to get a handle on the financial cost of delay, it tends to materialise not in the immediately coming year but later than that. That being the case, it is actually possible to make up lost time on certain things, if not on all things. I think, in a rather roundabout way, what I am saying is that I would not expect the difference between decisions on financially significant matters taken in, say, October, and decisions taken in, say, January of next year, to be critical to defence expenditure in the coming financial year. I do not know whether my colleagues would wish to comment on that?

Chairman

574. You told us, both in December and January, there would in practice be no change in the role of the Royal Navy submarines. Is that still the case?
(Mr Jackling) That is still the case.

575. What peacetime tasks are being most seriously affected by the substantial reductions which have already happened?
(Mr Jacklin) I think, Chairman, one should probably consider that both in the longer term when the new force structure is in place and in relation to the shorter term.

576. Tell us first of all what is happening now as a result of the fact that, more suddenly than anyone certainly outside the Ministry of Defence realised, you have had the reductions you have had? What effect is that having today on peacetime tasks?
(Mr Jackling) I think it is fair to say, Chairman, that any current and short term shortage of availability of submarines for training purposes, on which I know the Committee has been informed, is a product not simply of Options for Change and its implementation. I think the Committee is aware of the role of the submarine fleet in training submariners - it is a crucial role and I am sure the Commodore can develop the point for you if you like - but the significant amount of sea time which is a necessary part of the training of submariners obviously requires the availability of submarines. We have to have in mind in taking or in recomending to Ministers decisions on the implementation of pay-offs snd the running down of the new force structure just what the consequences of those decisions will be for that short-term problem and I think it is fair to say that such considerations will influence our advice on HMS VALIANT and HMS COURAGEOUS.

577. Perhaps the Commodore could tell us more about these considerations.
(Commodore Blackham) The particular problem to which Mr Jackling referred was the problem of training units in ASW work and for that purpose, of course, submarines are an important part although not incidentally the only way in which it can be done because we have these days quite accurate and quite complicated simulators which can be used a great deal and we can use artificial targets but also we can use Allied targets and we do so use them. By and large the problem is containable but it has become more difficult in the short-term for reasons that the Committee is aware of.

578. There is a problem now?
(Commodore Blackham) There has been a shortage of training now but that can be recovered quite easily.

579. Well then if you look back at the recent operating programme, what has had to go because of the shortage?
(Commodore Blackham) In terms of submarine operations in particular?

580. Yes?
(Commodore Blackham) Clearly, as the Committee is very well aware, training has been difficult to perform to the full extent and other operating tasks will have had to have been adjusted to fit the availability of submarines.

581. Would you say that the effect of training has been serious?
(Commodore Blackham) I think it has been significant but temporary.

582. Temporary until when?
(Commodore Blackham) Well, I think the Committee is aware that one cannot say with certainty when submarine availability will be restored to its maximum but I am fairly confident recovery can be achieved within a period of a couple of years or so.

583. We have got a significant difficulty in training submariners over the next two years?
(Commodore Blackham) We have got a difficulty in training certainly.

584. Are you using SSNs instead of SSKs to maintain national and NATO peacetime commitments in terms of training and trials and so on?
(Commodore Blackham) We use both in any event.

S85. Are you using SSNs where you would have used SSKs?
(Commodore Blackham) I am not sure one can make that kind of distinction, Chairman. For most exercises either vehicle would provide a satisfactory facility and amenity.

586. They have different roles.
(Commodore Blackham) I am not sure that that is strictly true. They have different characteristics which make them more or less suitable in particular roles.

587. And different areas in which they can operate using the characteristics that each has that the other does not?

[Chairman *Contd*]

(Commodore Blackham) Yes, quite clearly I can expand at some length on the difference in characteristics and there are some submarines that cannot operate in some areas but the governing factor in where it can go is the difference in draught and the difference in draught between the two classes is quite small.

588. Have there been any changes in the number of or the nature of Government-directed tasks?

(Commodore Blackham) For submarines?

589. Yes?

(Commodore Blackham) No, Chairman.

590. None at all. We have had discussions in the past and you have tried to persuade us that the numbers that you came to conclude were right - 11 or 12 SSns, 4 SSKs - were arrived at in accordance with a rationale out of your own Ministry rather than anything to do with finance. So in that rationale what were the assumptions about availability that you made? If you have 12 SSNs, for example, how many does that produce on patrol?

(Mr Jackling) Chairman, could I just come back to your preamble?

591. Yes, tell us I have got that wrong!

(Mr Jackling) No, Chairman.

592. Tell us it is the budget and Treasury that are driving you!

(Mr Jackling) You said that the force level was arrived at in accordance with a rationale from which cost considerations were excluded. I think that was the implication in what you said.

593. I said you were being driven by military commonsense rather than financial stringency. That is what I put to you.

(Mr Jackling) I would not then want to contradict you.

594. Please do. I am very much hoping that you will and we will have a much more interesting session!

(Mr Jackling) I thought that your introduction implied that the cost parameter was absent from our consideration and I think you have been telling us, of course, that it was not but what you have emphasised is that the driver for the work last summer was he transformed or potentially transformed international scene and the military threat within that. As to the number of submarines which we would hope to be able to generate from a fleet of about 16 I think we would have one expectation for normal peacetime purposes and another expectation for wartime given that we now expect significantly longer warning of the sort of conflict which might require our submarines to be engaged on major operations against the Soviet Union.

595. Give us your peacetime position.

(Mr Jackling) I was going to give you the wartime number, Chairman. In that latter context we would hope to be able to generate certainly 10 SSNs in relation to the sort of warning time* and maybe more.

596. In what sort of period would you generate 10 out of a fleet of 12 or 11?

(Mr Jackling) Well the 10 figure I gave you was on the assumption which we currently have about the likely warning of a major conflict which I think you have been briefed on.

597. What is that assumption?

(Mr Jackling) We talk now of a period of between 18 months and 2 years being necessary for the Soviet Union to recover itself so that it could mount a major attack on NATO across the board.

598. As far as I am concerned this is a totally new assumption. Maybe I have got this wrong and I have missed something but you are saying there is no capability whatsoever?

(Mr Jackling) No, Chairman, not at all.

599. Let us make sure we understand this. What is the assumption of the threat? The assumption in the past, as I understand it, was 24/48 hours. Are you now actually saying that has become 18 months to 2 years. I am sure we are misunderstanding each other.

(Mr Jackling) I think we are, Chairman.

600. Good. I am very pleased to hear it.

(Mr Jackling) There is a limited amount I can say about this in an open session but we have made it clear in all that we have said about Options for Change that it takes as a premise the fact that we would receive a very considerably longer political warning of a change in the strategic situation such as would provide a context for the sort of operations we are talking about here that is a consequence of CFE and many other things on which you have been briefed. It extends the sort of warning time* of a major conflict out into a year or two rather than weeks which has been possible in the past.

601. Well, I am fascinated because this is new and this is very interesting and it is very significant indeed and if that is a decision which has been taken presumably at the highest levels both in your Department and across Government, I think it is a very good thing that this has come out in public session.

(Mr Jackling) I do not think that it is new, Chairman.

**Footnote by witness:* In this context "warning time" is meant in a broad sense, to include that period during which political and other indicators might be expected to precede indicators of warlike preparations. It relates specifically to warning of a major conflict for which the Soviet Union would itself need to reconstitute a capability.

[Chairman *Contd*]

602. I am looking at my colleagues to see if I have missed something and they are looking as puzzled as me. You are actually saying there is no threat from the Russian military capability that could in reality be exercised in under a year?

(Mr Jackling) No, Chairman, I am not saying that. The Soviet Union has capabilities which it could deploy in offensive operations against NATO in much shorter timescales than that but what I think we have said to you in the past is that apart from the change in the characteristics and level of capability, the most significant change which underlay the Options for Change work was the change in the political climate, in the political context, and it is that point, with the CFE, which has led us to suppose that we would have very much more warning than we could have expected in the past of a reversal of recent international developments that might pose a threat, or raise the prospect, of a major conflict between NATO and the Soviet Union and that I think has been made clear.

603. I am not necessarily disagreeing with you but I am just trying to get this out because I think it is very significant indeed. Are you then saying that your rationale - and let us get back to the subject we are looking at - for this one-third plus reduction in the submarine fleet is not the Soviet capability but your assessment of the Soviet political intentions?

(Mr Jackling) No, Chairman, I am not saying that either. You did ask me a direct question about warning time* in essence and in trying to give you as full an answer as I can I alluded to the fact that if we had the sort of warning time which we now envisage for the possibility of a major conflict then I would hope that we could generate as many as ten or perhaps even more SSNs. Then you asked me what sort of warning time that implied, and I said that between 18 months and 2 years was the assumption behind that figure. Of course the Soviet Union has a capability to mount a discrete threat against a limited objective in very much shorter time than that. But I think official witnesses have said to you, Chairman, that we cannot ourselves envisage that happening in present circumstances, and the Defence Secretary acknowledged that, in his statement on Options for Change last year, when I think he did make it clear that we had in mind the possibility of reconstituting our military capabilities across the board if there was evidence of a major change in the international situation, which would take a considerable time to mature. That is why we would expect to have time to reconstitute. But I do not want to mislead you, Chairman. I wanted to make clear that the figure which quite surprised you of the number of submarines we hope to be able to generate in a wartime situation, did make an assumption about the very long warning time for a major change in the political climate.

604. I fully understand, Mr Jackling, and there is no need for us to be in conflict over this. What you have told the Committee, I think, is fascinating because it is an inside knowledge of some of the fundamental thinking on Options for Change, and it is a very good thing you should share this with us and we should have a discussion and debate about it. I fully understand that if you have a fleet of, say, 12 SSNs, within two years you can get ten of them on the road, and I do not think anybody is arguing with that----

(Mr Jackling) Less than two years.

605. All right, 18 months. It would depend on the depth of refit, DED and on a number of things. However, that is not what grabbed me to go on with this line of thinking. What I am fascinated by is the dichotomy, if there is one, between your assessment of the Soviet capability and what we need, we collectively need, to match that capability, and then your assessment of their intention to use it, which would seem, from what you have said, to have generated in the Ministry of Defence the thought we can make do with a much lesser force level to meet their intention than we would otherwise need to meet their capability, which as Mr George said in earlier questions has if anything been enhanced over the last two years. So, whereas for 40-odd years we have been matching as best we can their capability to launch aggression against the West, we are now going to a reduced level not because their capability is any less but we now assess they do not have the intention to do that. I am not saying, if that is the assumption, it is a wrong assumption, what I am saying is that it is a significant change, and if that is what has motivated you to decide this new significantly reduced force level, we are very interested, as a Committee (and a lot of my colleagues will have questions) in how you came to that rationale, and where you balance the matching of capabilities and the matching of what you think is a political intention, because that is a quite different subject.

(Mr Jackling) I think I am in danger of allowing you to make rather too much of an answer and an explanation of an answer which was trying to be helpful to the Committee.

606. It was enormously helpful! Perhaps that was the mistake!

(Mr Jackling) Certainly not, Chairman. We are here to be helpful to you, which is why there are so many of us! What I implied by my answer was that, if you like, in the optimum circumstances when we have a very considerable period of political warning of a major change in the international situation, which might lead to a renewed direct threat and the need to match it, that in those as it were optimum circumstances we might expect to be able to generate that number of submarines. It was my intention to say no more than that. It was not my intention to say that the Soviet Union could only mount a threat to which these capabilities would be relevant in that

**Footnote by witness:* In this context "warning time" is meant in a broad sense, to include that period during which political and other indicators might be expected to precede indicators of warlike preparations. It relates specifically to warning of a major conflict for which the Soviet Union would itself need to reconstitute a capability.

[**Chairman** *Contd*]
sort of time. Obviously that is not the case. But I think you have been told by other witnesses, and I think the Defence Secretary has implied in what he has said to the House, that we would expect a very considerable period of warning before the Soviet Union was in a position to mount a threat to NATO across the field. I think we have also told you, Chairman, at various times that we do not presently envisage a threat to the United Kingdom and its interests at sea, the possibility of active operations between our forces and their forces at sea, outwith such a context. But that is not to say it is not possible, and it is certainly not to say, Chairman, which is what I think you thought I was saying, or which you might have wanted me to go on to say, that our decisions or recommendations on the force level of submarines based on what might be regarded by some as an uncertain if not optimistic assumption about the range of warning time we would have. That is not the case. Obviously if we have limited warning of the sort of conflict which would engage our submarines in those operations, there might be fewer hulls available because of refits and dockings, as you have suggested.

Chairman: I will want to come back to that part of it, but thank you. Two other members have questions.

Mr George

607. Had it not been for the great intelligence failure to inform on the Falklands, Afghanistan and Kuwait, I would be greatly encouraged by the MOD's perception of the threat. The point I would wish to ask is this: if the threat is reconstituted, it might take a shorter period of time to evolve than would be within the capability of shipbuilders and the Ministry of Defence to reconstitute a capability. There might be a hopeless discrepancy between a change of threat and an ability to build more submarines. I am very worried by the fact that whilst I hope the threat has disappeared, in the last couple of months the General Staff has regained the initiative in the Soviet Union and many of the changes that we were hoping or praying for have either been reversed or have slipped down. Are you absolutely confident your assumption of the threat is properly accommodated by the submarine shipbuilding programme, such as it is?

(Mr Jackling) Mr George, perhaps I can make two points in reply. Obviously I am not the person with whom to engage in a great discussion of the threat----

Chairman

608. I get the impression you feel we are moving above your pay grade!

(Mr Jackling) Not pay grade but what I am paid to do!

609. We have no intention of embarrassing you more than mildly, Mr Jackling!

(Mr Jackling) You have always been generous, Mr Chairman! The point I would make, Mr George, is that in coming to a figure of about 12 SSNs, we judged that that figure was enough, was appropriate, for the contribution which we would make to NATO's naval maritime operations. The question which has been at issue between myself and the Chairman is the availability of submarines. Your point is absolutely right, that it takes some time to build submarines and it would be possible for the threat to develop over a period of a year, or two years or whatever with changing political circumstances, and that could be happening more quickly than we could actually bring into service new submarines from scratch. I would ask Mr Creighton if he could perhaps develop the point of how long it would take us to build new submarines but in making his statement last year the Defence Secretary made clear that we would be looking at the consequences of more warning time and different kinds of threats developing for the readiness of our forces and for the possibility of reconstituting those forces to a higher level than we are planning to move to at the moment. He also made clear that in reaching final decisions about that level he would have an eye to international developments over the coming 12 months and certainly the Government will wish to take stock of all of these developments including those in the Soviet Union before reaching a final view on Options for Change.

Mr Churchill

610. Mr Jackling, you said that there is only a limited change in Soviet capability so far and indeed there would appear to be evidence that they have not actually cut back much of their production rates on submarines and other naval assets. Is that the case?

(Mr Jackling) Yes. A word is being whispered in my ear, Mr Churchill. We are, I think, moving into areas where firstly you have had a brief from the expert and, secondly, to give you any useful information that brief has to be at a classified level so what I did say in answer to the Chairman, I think, was that we did not think anything had happened since you received that brief that impacted significantly on the judgments we made about the size of the submarine fleet.

611. But you have told us that you believe and the Ministry of Defence believes that there would be a longer warning time of a change in the political context in the Soviet Union. I would take issue with that. I think that already there are signs of a sea change compared to a year ago already underway in the Soviet Union with the military gaining much more authority. We see their reluctance to implement the CFE agreement in the way that had been anticipated and the time-frame that had been anticipated and is it not clear that there could be a rather abrupt change in the political situation in the Soviet Union and is it therefore wise and prudent for us to base decisions such as a 40 per cent cut in our submarine assets which is what is proposed under Options for Change on the basis we will have 18 to 24 months to try and reverse our lack of preparedness?

[**Mr Churchill** *Contd*]

(Mr Jackling) Mr Churchill, you are being helpful to me in giving me a further opportunity to clarify what I said to the Chairman. I am grateful to you. We did not make recommendation to Ministers about appropriate levels of the submarine fleet that took as the major assumption our expectation of warning time. We made recommendations about the appropriate size of a fleet which took account of our expectations of the Soviet capability in the future about which you have heard from the expert and at the appropriate level of classification. We took account of the fact that we operate as part of an alliance in making a significant contribution to such operations and we do not envisage fighting a war at sea against the Soviet Union on our own and never have done. So it is not the case that the recommendations about the appropriate level of the submarine fleet rest critically on assumptions about warning time. What obviously is significant is that different scenarios and different degrees of warning time will influence how long the Royal Navy has to do certain things before it is significantly reinforced by the United States Navy and there are obviously a range of different scenarios which would make different demands on our submarine flotilla size for different periods of time. Having taken account of both our expectation of Soviet capabilities and having reviewed the possible scenarios and the warning times* associated with them, and taking account of NATO's strategy and plans for responding to such scenarios we reached the view that the level of SSNs and SSKs which is envisaged in Options for Change would be appropriate and would enable us to continue to perform the tasks in war time for which submarines are designed.

612. Given that one cannot foresee political intentions and indeed political intentions can change overnight, do we have any alternative but to base plans on the basis of the Soviet capability which confronts us even today?

(Mr Jackling) Mr Churchill, I think what I was saying in reply to you is that is what we did. The question of warning time clearly impinges across a whole range of military capabilities and perhaps more significantly affecting the other services rather than the Navy. The question of warning time obviously impinges on how likely it is and for how long the Royal Navy would be required to do certain things with not very much assistance from our Allies and that is where obviously we reviewed our current expectations of what might happen in the context of recent developments and took a view about what was likely. But that did not determine the number of submarines which we recommended to Ministers as appropriate and quite honestly it could not have done, given the time it takes to build extra submarines. So the issue that we have been discussing over the last 10 minutes or so is all about the availability of assets which we plan to have rather than whether that number of 12 is sufficient because we think we can build more in the period of warning. That is not the situation. I apologise, Chairman, for misleading the Committee if I have done so.

Chairman: No you have not. I think you have got us all thinking.

Mr Home Robertson

613. I am sure we all very reassured by the prospect of having 18 months to 2 years warning of hostilities.

(Mr Jackling) That is not quite what I said, Mr Home Robertson, just to get the record straight.

Chairman: You have reassured Mr Home Robertson at least.

Mr Home Robertson

614. Just in case the timetable would be a little bit tight, how long would it take you to move 10 operational submarines to sea?

(Mr Jackling) Can I look to my right.

Chairman

615. We are back to the tight question which I started by asking. Perhaps in answering Mr Home Robertson perhaps you could do it in another way.

(Mr Jackling) I am slightly nervous of doing so. As you know, there are limitations about what we can say in public about the availability of boats.

616. That is well understood but your planning assumptions are what we are on about. When you decided you were going to have a fleet, say of 12, how many of those did you reckon would be on patrol given say a month or three months or 6 months rather than 18? The answer you gave us was 10 within a period of 18 months, 2 years.

(Mr Jackling) I said as many as 10, if not more, in 18 months. Perhaps I could ask Mr Oughton to answer. A different voice might be more informative.

617. I am sorry to take over your question, Mr Home Robertson, but what is your rough rule of thumb for availability, let us say, from day to day in a fleet of 12.

(Mr Oughton) In normal peacetime circumstances you might expect something like two-thirds of your fleet to be available at very short notice.

618. As many as 7 or 8?

(Mr Oughton) It might be as many as 8. I would say no fewer than about 7. Two-thirds is about the broad order of magnitude. How quickly you can then bring them forward would then depend on the circumstances. In normal peacetime operations there are considerations of base porting time and crew rotation considerations that you have to take account of. If you are working up to a time when you would be in a time of tension those considerations would be secondary. You bring the

**Footnote by witness:* In this context "warning time" is meant in a broad sense, to include that period during which political and other indicators might be expected to precede indicators of warlike preparations. It relates specifically to warning of a major conflict for which the Soviet Union would itself need to reconstitute a capability.

[**Mr Churchill** *Contd*]
organisation forward from having submarines in maintenance periods tied up along side. If submarine were in a docking period it could be brought forward in a matter of weeks. If it were conducting an essential re-fit clearly that would depend on the circumstances of the re-fit.

Mr Home Robertson

619. Three-quarters of this much reduced fleet of 16 would be made up of SSNs under these proposals. Do these availability projections you are outlining here take account of the sort of difficulties which can arise, as has been shown by experience with nuclear propulsion?

(Mr Oughton) I am talking about normal circumstances. Our plans envisage sustaining a force level of about 12 with newer classes of SSNs, and so one would expect to retain in service the newer and more capable SSNs, and clearly we make a judgment boat by boat as to the circumstances of that vessel. Precisely what that judgment would be in the case of each boat, we would not be able to discuss in open session.

620. Am I right in thinking the availability rate of SSKs tends to be rather better?

(Mr Oughton) You would expect in a force of about four to have something like two-thirds to three-quarters available. You would expect at any one time to have a boat in refit.

Chairman

621. Two-thirds of four is interesting!

(Mr Jackling) It is about three, Chairman!

Sir Barney Hayhoe

622. We have spent a fair amount of time, following your answer to the Chairman's question a quarter of an hour ago, and I am still a little confused. I suspect from the way the press are scribbling that they think some new revelation has been made, whereas I suspect from your answers you believe you are merely saying what has been common knowledge and what has been well-known by our Allies and accepted generally throughout the Alliance. Would it be helpful if you, in a sentence, indicated whether you have revealed something new or whether you have been merely restating, perhaps in a fascinating form, something which was well-known?

(Mr Jackling) Sir Barney, thank you very much.

Chairman

623. He will expect your cheque!

(Mr Jackling) I have actually been saying no more than what is already on the record. I made the comment in the context of trying to give the Chairman the best figure I could for the availability of submarines.

Sir Barney Hayhoe: It is useful to have that clear, for your career if not for mine!

Chairman

624. I must put one more question arising out of an answer. You said that as a result of the reassessment of the threat and the priorities, you came to the judgment that a fleet of submarines of this sort of size was appropriate as our contribution to the NATO task. But you did not consult NATO about this reduction, so how do you know it is commensurate with the NATO task?

(Mr Jackling) I think you have covered this ground with my colleague, Mr Mottram. I think the answer is in two parts. First, that obviously we were aware through normal day-to-day contacts with Allies of the drift of their thinking in the period during which the Options proposals were being developed. But the Defence Secretary did make it clear on 25th July last year that there would follow his announcement a period of intensive consultation within the Alliance, and that the product of that period of consultation would have a significant bearing on final decisions by the Government. So I think the first stage of work was undertaken in full knowledge of the way in which our major Allies were likely to go, and the subsequent stages of work have been carried forward in parallel with a great deal of consultation in the Alliance, on which as you know Mr Mottram is in the lead.

625. I hope you have not offered any hostage to fortune by the phrase "drift in the Allied thinking", because I think that may be why we are spending so much time on this.

(Mr Jackling) I used the word "drift" in a different context, as I think you know, Chairman.

626. I said that I hoped it was not a hostage to fortune. Given you did not consult before July and the announcement and you have been consulting intensively since, was the decision to reduce the submarine fleet by more than one-third greeted with equanimity, approval, shock, horror, by our NATO Allies?

(Mr Jackling) I would like to answer directly and fully every question you put to me, but I was under the impression you did go over this ground in some detail with the responsible official, as it were.

627. We went over in some detail but not in terms of the strategic atmosphere in which you are answering questions about this decision. I am certainly keen to make absolutely certain I understand the military defence strategic rationale behind the conclusions you have come to, because there is still a nagging doubt that rather more of the budget than the Russians has gone into this decision. I may be wrong, but in justifying what you have done, I think one is entitled to say, what has been the reaction of NATO? Are you about to tell us, or are you within Options for Change about to say, which would be perfectly understandable, that we have had a look at this for the last seven or eight months and we maybe need a couple of SSKs or one less SSN? A decision taken without consultation appears to be locked in concrete.

(Mr Jackling) I do not think that is the right conclusion to draw. You would not expect me to tell you what we might be about to say on this issue.

[Chairman *Contd*]

628. I live in hope!

(Mr Jackling) But, as I understand your question, it is, has the reaction of our Allies to the outline proposals which were unveiled last July changed over the last few months in the light of developments over the last few months. Because that is not an area in which I work, Chairman, I cannot give you an unequivocal answer, but it is my impression that if Mr Mottram were here, he would answer that no.

629. It would be a very much longer answer than that, I assure you! I have one or two detailed questons before we turn to the size and shape of the future fleet. We have got behind ourselves now because of this fascinating diversion. What does an SSN and an Upholder SSK cost to buy? Roughly speaking? I do not want any confidential tenders, what is the order of magnitude?

(Mr Creighton) In broad terms, an SSN is of the order of 300 million, and an SSK is about two-thirds of that amount, between half and two-thirds*.

630. 150 to 200 million?

(Mr Creighton) In that sort of bracket, yes. I would not wish to be more specific at this time.

631. What are the annual running costs of a fleet of SSNs and SSKs of average age in terms of personnel and maintenance?

(Mr Jackling) The running cost of SSNs and SSKs are, for SSNs about 5 miilion a year, and for the latest class of SSKs about 3.5 million a year. They include manpower but they do not obviously include the cost of major refits and major maintenance.

632. Then life cycle costs including refits? What life cycle costs do you attribute to an SSN over the 25 year life, say to the latest T class to join the fleet?

(Mr Jackling) I do not think I can give you today a useful figure for that. We have a broad feel for the relative life cycle costs of SSNs in relation to SSKs, and I think I am right in saying that the life cycle cost of the former is quite considerably greater than the latter. Three times the latter, I am told.

633. Do you not have any planning figure for the life cycle cost of the latest T class? I would be surprised if you did not.

(Mr Jackling) I think our answer to you, Chairman, is that we do not have it with us and perhaps we should and obviously there is information on that in the Ministry.

634. I was going to ask you how it compares to a type 23. Do you know?

(Mr Jackling) Again we can answer in term of relativity.

635. Are we nearer to getting back on your brief again?

(Mr Jackling) The SSN is more expensive than a Type 23.

636. Is it life cycle costs.

(Mr Jackling) Life cycle costs.

637. By a large factor?

(Mr Jackling) Not by a large factor because the relative rates of class and manpower are different in the two cases. Manpower is the biggest single item. Again I do not have the figures but it is not by the factor of two or three that you have heard.

638. I think that the Committee would be interested in these figures.

(Mr Jackling) Can we give you a note and give you what help we can?

639. So that we can make a comparison, certainly.

Mr Home Robertson

640. Can we ensure that includes a figure for the decommissioning costs of the reactor plant for the SSNs?

(Commodore Blackham) That is part of the life cycle costs.

Chairman

641. Is it part of the life cycle costs?

(Commodore Blackham) Yes.

642. In that case I am not surprised that you do not know the answer! I think we may have that information with and without the decommissioning problem because I can understand the difficulties of that one.

Mr Churchill

643. Mr Jackling, are we not in danger of losing the UK submarine design and building capability in view of the delay with the introduction of a new class of SSN and cancellation of further Upholder Class SSKs?

(Mr Jackling) Mr Churchill, I think the answer there is a pretty confident, no. Obviously in developing our forward plans for procurement in line with the overall force structure envisaged under Options we take account of the implications for the likely incidence of orders for the ship building industry. You will have had a lot of information, I know, from the industry itself about its own assumptions on requirements for orders for a healthy and viable future and all of that. I have, I think, already said to the Chairman that our proposals in this area are still maturing. They have not yet resulted in any decision from Ministers so obviously I am not in a position to go into great detail with you but I can say firstly, as I think Mr Mottram said to you at the very end of his last session, that maintaining a viable national capability for nuclear submarines was an important policy objective. I think I can also say, and I would ask Mr Creighton

**Note by witness:* The cost of an UP HOLDER Submarine is nearer to half the cost of an SSN around £150m.

[Mr Churchill *Contd*]
to come in if he would like, that in developing our plans we are confident that they will have that result.

(Mr Creighton) Yes, indeed we do recognise the importance of certain capabilities within this country for supporting not only the future programme but to maintain the capability of the existing submarine programme and there are companies which are strategically important to us in that process and regard has to be paid to that. Of course, in looking at the future programme there are many other factors which influence what the future programme looks like.

644. You speak of the importance of this capability but I am sure you will appreciate that it is not something that can be sustained from thin air without orders and already VSEL are starting the running down of its unique ship building work force. Is that not a matter of concern to the Ministry of Defence?

(Mr Jackling) Mr Churchill, I have made it clear that the maintenance of a national capability on that front is important to us not just to the future production and procurement but also to the running of the existing fleet. VSEL has made decisions which are for VSEL to make about the level of its work force but I am not aware that they have done anything or are proposing to do anything which hazards the essential skills and capabilities which we regard as important nationally to maintain.

Chairman

645. What would you do if they did, if you did perceive they were starting to have to dispose of skills which you would consider vital?

(Mr Jackling) Chairman, we are getting into a hypothetical area, reasonably enough perhaps. They would presumably only do so if they envisaged that our potential rate of order could not justify commercially the maintenance of that capability and then we are back to the answer that I gave earlier, that it is important to us that this capability is maintained. We need it for the production of the submarines which we shall have to order in order to maintain the force level that is envisaged under Options and that is a very important consideration in formulating advice to Ministers.

646. Was this a consideration that determined your advice about force levels.

(Mr Jackling) On the force levels, Chairman?

647. Yes. When you decided to go from 16 to 12 and 9 to 4 was one of the considerations that that would still leave a viable submarine capability?

(Mr Jackling) The fact is, Chairman, that it will but my recollection of the work last spring and summer is - and I will look to my right for confirmation - there was no moment when we said, "Well, if we go below this level the implications for the rate of ordering are such that it will put at risk this national capability."

(Mr Oughton) That is correct, Mr Chairman.

648. That was not part of the discussion?

(Mr Oughton) No.

649. Do you know what the figure is below which if you went you would put at risk our design and building capability?

(Mr Oughton) There is an important consideration here and that is the base line you would judge for the company to be viable. Of course, Mr Chairman, you will have had your own discussion with the company. We have to be careful not to start from where the company is today because you will appreciate the company has built up a significantly higher workforce to deal with the bulge construction requirement relating to the Vanguard force. Prior to that the workforce capability at VSEL was rather lower so we are in a sense returning to a level we were at before the Vanguard bulge took place and precisely what level is needed for this would need to be discussed with the company based on what our future plans would be. We are confident that we are not in the position now of having gone below that level.

650. That is a very interesting answer. Are you there in order to sustain the submarine building industry or there to defend us against the threat that you perceive?

(Mr Jackling) The latter clearly, Chairman.

651. I am not taking issue with you yet.

(Mr Jackling) Our answer to you is first that the force level necessary to maintain this capability was not a maor consideration for formulating the advice last year because we were not contemplating a force level which would put it at risk. That is the first point. The second point is clearly therefore the force level is determined by other factors, the threat and the national situation and so forth. The final point, Chairman, that I think is important is the actual force level which we are seeking to sustain and the incidence of orders that that generates and that seems to me to be the important consideration so far as maintaining these capabilities is concerned. Obviously it would be a source of concern to us if the prospective rate of orders led the company to disperse and dissipate an important capability which could not be reacquired when we needed it.

Mr Churchill

652. Can you say when you now expect to be able to place a firm intention to VSEL for the next generation SSN. What sort of in-service date are you working towards for the new SSN 20, whatever her nature?

(Mr Jackling) Mr Churchill, I cannot give you a firm date and we are here, I am afraid, talking about a proposal which has been developed in the course of the last few months and there are several possibilities on this front. There are several ways of responding to the requirement for the next generation of SSNs or a further procurement of SSNs. These are things on which we are currently working actively and on which our Ministers have yet to take

[Mr Churchill *Contd*]
any decision, and I think in accordance with the well-established and understood conventions, I cannot go further than that.

653. You have yourself in earlier reply conceded this is not a capability which the Ministry of Defence can turn on and off like a tap. We are talking about a workforce at VSEL of something like 15,000; we are talking of a workforce at Cammell Laird of something like 5,000; and more than 80 per cent of these workforces are dependent on one prime supplier and customer, namely the Ministry of Defence. So unless there is going to be some continuity in orders, there will have to be absolutely drastic cuts in both those establishments.

(Mr Jackling) Yes, Mr Churchill. On Cammell Laird, I think the company has already announced its decisions, but I think also the Committee has been told that we do not conclude from the result of those decisions or the prospective result, that there would not be an indigenous capability for the construction of further SSKs, if we thought that is what the force required. But clearly the driver here is what rate of ordering is necessary to sustain the force level which the Government judges is appropriate and sufficient to the task and circumstances. I indicated to the Committee that in formulating proposals on that front, which is an interaction of pay-offs on the one hand and procurement on the other, we had an eye to the impact of that incidence of ordering on the company. I also, said I was confident that we were formulating proposals and possibilities which would secure that.

654. Can you say anything which would reassure the company and its employees thst there will not be a lengthy hiatus in the placing of such orders?

(Mr Jackling) I do not think I can give you that assurance, Mr Churchill, because we are talking about propositions which have yet to be considered by Ministers and on which they have yet to take decisions. But I hope the company would take some comfort from the fact that this is not a consideration we disregard.

655. We understand it was at the MOD's behest that a joint venture company was formed in early 1990 of British Aerospace, GEC, Rolls Royce and VSEL to manage project development and compete for prime contracting. Is that still your preferred way forward?

(Mr Creighton) The procurement approach for any future programme clearly depends on what it is we are going to buy, and that is a subject which has not yet been decided by Ministers, and so it is not possible at this stage for us to say precisely how the procurement will be handled when it comes. What I can say is that that sort of strategy is one we believe gives us greater potential for the future, and one we are quite likely to wish to pursue.

656. What response have you made to VSEL's proposal for a six month pre-project development phase submitted a month ago?

(Mr Creighton) This is an issue which clearly has to await ministerial decisions. Until we have those, it is not possible to make any movement and any positive response to such proposals, but we hear what VSEL have to say and have taken note of it.

657. There are obviously various alternatives to going straight from a T class to a radically improved SSN, building either on an improved T class concept or a reduced Trident class concept. VSEL have, as you know, given us an idea of the cost benefit analysis of the various options, can you give the public some idea of the cost of improvements in performance envisaged in the Staff Requirement 7027 approved in August 1989? Of those - speed, silence, cost - where would you be prepared to hone down to achieve a cheaper solution?

(Mr Jackling) I am afraid the answer to your question is, no, we cannot. We would be getting into the operational characteristics of a particular submarine and I just do not think we can do that for you in public session.

658. Can I ask you whether the PWR 2, or a variant of that, will be used in a new class of SSN?

(Mr Jackling) Whether it would be or could be?

659. Whether it is likely to be.

(Mr Jackling) It obviously could be, whether it would be is again something we are looking at, and we have yet to take any decisions about.

660. How much public money has been spent on developing it?

(Mr Jackling) I do not have that figure.

(Mr Oughton) We could not give you the precise cost this morning. Of course the PWR 2 reactor has been developed in the context of the Vanguard class submarine and that development has been completed within an existing programme. Separating those costs out and attributing them to a new programme would be difficult to do in this context.

661. But would it not make sense to use it not only for the Trident class but also for the new generation of SSNs?

(Mr Oughton) That is certainly one of the options we would want to look at. It might well.

Chairman

662. As far as the Upholders are concerned, how long a gap can there be before it becomes too expensive to start up? Suppose you decided you wanted more than four, when do you reach the limit of time, given what has happened since you decided to cancel the rest of the class?

(Mr Jackling) Can I give the first part of our answer and then ask Mr Creighton to come in? We do not expect to find ourselves in that situation, and as I think I have said already more or less clearly, we do not think anything has happened since July or even December which calls into question the overall size of the submarine fleet or the balance within it between SSKs and SSNs. Given that you have asked a hypothetical question, can I ask Mr Creighton----

[**Chairman** *Contd*]

663. So that is now a firm position and not an option?

(Mr Jackling) No, as I think you have indicated and you have been told on other occasions, the Options proposals are still being worked through, all their consequences and details are still being developed, and the Government has yet to take final decisions on the way forward.

664. But you do not expect more than 4 SSKs and 12 SSNs?

(Mr Jackling) I might have an expectation but the decision is for Ministers.

665. Let us turn to refits. Most of our questions are about SSNs. Are you contemplating concentrating on just one nuclear refit complex? Could Devonport or Rosyth alone handle all the SSN and SSBN refits required?

(Mr Jackling) I am afraid this is another area where we are still developing our ideas and gathering in the necessary information. I do not think we are in a position this morning to give you anything more on that front.

666. Do you not know whether one, either Devonport or Rosyth, could cope with the whole lot of SSNs and SSBNs?

(Mr Heyhoe) Further work would be needed to establish that. As Mr Jackling has said, we are looking at the whole refit scene.

667. Can you tell us more as to how it is looking in terms of what is the position, not in terms of the advice you will be giving?

(Mr Heyhoe) The work we are doing is trying to establish exactly what is possible, and I think it will be a little while yet before it has done that. When we know that, we can then enlarge on the options.

668. How do you define "a little while"?

(Mr Heyhoe) We are talking here, I think, Chairman, about a period of, say, 12 months.

669. Another year before you can reach any conclusions as to whether or not you could refit all nuclear submarines, SSNs and SSBNs, in one place?

(Mr Heyhoe) I think so, yes. Clearly there will be indications between now and then, but I would think that is about the period of time, yes.

670. Why so long given that you have got the figures and you have got the planning advice for refits and you have got the capacities? Are you saying that this is more than just a military decision or an industrial decision?

(Mr Heyhoe) No, I am not saying that. I think there is also an 5 engineering dimension and I think it is actually rather complicated. I think the 12 month period I have given you is a realistic assessment of how long it will take.

671. Just to look at the engineering implications?

(Mr Heyhoe) No, to look at all the implications.

672. What are the other implications?

(Mr Heyhoe) The other implications are the purely physical ones and the capability ones. They all come together really.

673. I remain slightly surprised it should take you a year - or more than a year as you have had 9 months already.

(Mr Heyhoe) I think it was mentioned to the Committee at the session which was held on Trident fairly recently that a study was being done about our ship-building, our repair and our re-fit arrangements for the future. What I am actually referring to now is that piece of work. It goes much wider than just the submarines, of course, but so far as submarines, especially the SSNs are concerned, there will be a need for follow-up work to establish whether one base would be capable, basically, in engineering terms and in all other logistical terms.

674. When you say it goes wider than submarines you mean there are other implications for the viability of the dockyards rather than just the basic engineering environment and space problems of concentrating all of our nuclear refitting into one place.

(Mr Heyhoe) When I said it goes wider than submarines, I mean the work we are doing looks at the whole fleet, Chairman, surface ships too.

675. You cannot come up with a solution about the very particular nuclear refitting requirement without looking at all the rest of it? Is that what you are saying?

(Mr Heyhoe) I think we would prefer to take that decision in the knowledge of our overall intentions for the rest of the fleet clearly because the yards are involved in all aspects of maintaining the fleet and not just the nuclear submarine element of it but it is, as you imply, clearly a separate piece of work.

676. I am sorry to press you on this but whatever decisions you might make about the whole of the fleet and its support - I understand that is extremely complex and suffers political overtones - nevertheless you have a specific tangible requirement in terms of safety in of all of the things that apply to nuclear refitting which are quite separate, are they not, from the whole concept of fleet support and maintenance?

(Mr Heyhoe) Yes, that is certainly true.

677. Why does one have to wait for the other? I am sorry, before you answer that are you saying it would not take you 21 months if it was just the nuclear inquiries?

(Mr Heyhoe) I said 12 months, Chairman.

678. Plus the 9 that we have had.

(Mr Jackling) Chairman, can I underline a point that I think David has made but what you have just

[**Chairman** *Contd*]
said does not quite acknowledge fully. I think when we are talking about the capability to do certain bits of work in relation to submarines, we are talking about a number of trades and skills and the balance of them and the size of the capability overall and that, as I understand it, is indeed the product of more than just this strand of work or issue. I mean that there are potential solutions to the problem that interact very directly with the solutions and proposals we develop for other parts of the fleet and I think actually you answered for us, Chairman, when you said you realised that the question of the overall support of the fleet was an immensely complex balance because it will not actually all come together in a jigsaw until all the pieces are, as it were, formed.

679. That is well understood. It is just that I was puzzled by the answer that so complex is the refitting of this new reduced submarine fleet that it takes you 21 months to come to a decision to do it. That is my surprise.

(Mr Jackling) The decision will be taken in the light of the whole picture, Chairman, and if you were asking us whether we have yet formulated a view about this element of it I think we would have to say to you it is part of the wider work. It still has to go to Ministers and we cannot give you anything specific.

680. You say in one of your answers in the Memorandum, "VSEL are showing some interest in undertaking SSN or SSBN refit or DED work." Have you approached them with the possibility of that and their capability and qualifications?

(Mr Heyhoe) Part of the work which I referred to in my previous answer, Chairman, has involved discussions with a number of yards as to what their intentions in various directions were. So we have spoken to VSEL but we have not spoken to them about it in the sense of any proposals or anything even as firm as that but we do know about their interest. We are doing our work in discussion with them and other yards and, if you liker, VSEL are the third side of the triangle which is made up with Devonport and Rosyth Dockyards in addition.

681. Are they qualified for SSN and SSBN refits?

(Mr Heyhoe) No, not as yet.

682. If the decision is that they should be, would public funds be made available for them?

(Mr Heyhoe) The reason that they are not able to do it yet is that up till now no private yard in the past has done SSN refit work, so they would need time, they would need investment and, above all, they would need licensing – all of which are matters for the company.

683. All of which are matters for the company? You would not consider it right to provide any part of your funds to facilitate this?

(Mr Heyhoe) I think, Chairman, the reason we are doing this work at all is to make sure we can do our refitting in the most cost-effective way for the Navy and the taxpayer which are much the same thing. Clearly, if one yard was to be favoured on these grounds we would pursue it.

Mr Cartwright

684. Do we have any idea of the sort of financial investment that would be needed to enable VSEL to do this work?

(Mr Heyhoe) I do not myself have that.

(Mr Creighton) We have an order of costs knowing that it could well be in excess of £100 million of investment.

Chairman

685. You told us of the competition envisaged for the ONSLAUGHT refit which in the event was cancelled. What has been the past experience in general of submarine refit in the commercial sector outside the Royal Dockyards. You were going to have a competition for the ONSLAUGHT refit. Is that right, but in the end that was cancelled?

(Mr Jackling) Yes.

686. Have you got past experience and, if so, what of refitting in the "commercial sector"?

(Mr Oughton) Yes, Mr Chairman. We have refitted conventional submarines in the private sector yards in the past[1]. When we constructed the competition for the ONSLAUGHT refit we bore in mind the capabilities we were aware of in the private sector yards and put them in our tender list.

687. What about the lessons you have learned in doing this.

(Mr Jackling) They were satisfactorily refitted which was the implication or our considering them in the competition.

688. So open contract competition, as far as you are concerned, can be used again?

(Mr Jackling) Yes.

689. I think we have gathered that submarine support and shore training are most effective when one class of submarine is based with its own unique squadron support. What are your plans for the future given that? Are you going to base all the S class at Faslane, for example?

(Mr Jackling) Chairman, again I am sorry to repeat myself but you are asking us to speak to you about the steps that are currently underway and on which no decisions have been taken. I think it is a perfectly reasonable reply to make that obviously there are pros and cons of concentration in the way that you suggest and they will be taken into account in formulating final views.

690. I do not know that we know about the cons. Would you like to tell us about this? We were under the impression that the pros were overwhelming and that it was much better if you had one type of submarine to keep it in one place with all its spares.

[1]See evidence p.56.

[Chairman *Contd*]

(Mr Oughton) It is clearly important that people operating submarines and training for experience in a particular class that the support to that class should be as close as possible to the submarine itself. That is the main pro, as you have indicated. They have said that there would be cost implications in what you decided to do given where you have to start from and in any event most submariners rotate through all classes of submarine so the pool of experience is not perhaps as great as it might seem.

691. Do you expect that phenomenon to continue?

(Commodore Blackham) Which phenomenon?

692. That most submariners will rotate through most classes?

(Commodore Blackham) Yes, I do, Chairman.

693. You would?

(Commodore Blackham) Yes.

694. You do not think that given the change in the relative numbers, it will necessitate you getting most nuclear submariners in nuclear submarines and most conventional submariners in conventional submarines?

(Commodore Blackham) I think given the smallish force of conventional boats, it would be very difficult, and probably very undesirable, to confine people to that particular group of ships for a large proportion of their careers.

695. So you think the interchange will go on?

(Commodore Blackham) I do.

(Mr Jackling) And there will be a smaller number of classes in the future.

696. So the only con we have got out of you is cost, there are no other disadvantages?

(Mr Jackling) I think there are considerations of finance.

(Commodore Blackham) There are operational considerations as well. Where do you want to use the vessels, what do you want to use them for, and what does all that imply, would be other considerations.

697. And you say in your answer J about the UPHOLDER costs that you "hope to reduce the level of squadron staff through amalgamation with another submarine squadron". Could you clarify the significance of such an amalgamation?

(Commodore Blackham) I think, Chairman, that we start from a premise that today - well, not today but a year or two ago - we had a certain number of submarine squadrons and that on the face of it, if you have less submarines you ought to be looking to see whether you need the same administration support and structure for those. That would be a factor in the considerations. So one is looking to see what would be the most cost effective way of administering and supporting and training the number of submarines you have.

698. If you do reduce the level of staff through amalgamation with another squadron, does that mean UPHOLDER will be based other than at Dolphin?

(Commodore Blackham) I think we are back to where we started, are we not?

699. What I am trying to get out of you is, what follows as a consequence of a reduction rather than what is open to discussion and advice to Ministers. There are certain consequences which are inevitable.

(Mr Jackling) That is where I would venture to disagree, Chairman. I think there are a number of considerations that bear on the choice of where UPHOLDER is to be based. Some of them point quite clearly in one direction, and some of them might point in another direction. Because our thinking is not yet mature on this front, I think we would be in danger of misleading you if we said, "it follows from A, B and C". That has nothing to do with the confidentiality of advice to Ministers but simply there are so many things of which we have to take account that I do not think it is quite as clear as your question suggests.

700. Let us turn now to weapons. Offensive weapon development is progressing, but with a smaller force of highly capable submarines it would perhaps be wise to place a new urgency on self-protection. What plans do you have for submarine countermeasures and what is the timescale?

(Mr Jackling) Broadly we are not in a position to speak to you about the forward programme on this front. But what you say is clearly right. The logic underlying the Options proposals was that although we would have a smaller number of platforms so far as the Navy was concerned, and although the force levels of the other services would decline, there equality and capability would be sustained and improved. "Smaller but better" was the way the Defence Secretary encapsulated that objective. As a consequence we shall be pressing ahead with enhancing the capability of our submarine fleet in light both of the threat and the opportunities presented by refits and all of that.

701. Can you for public consumption give us some idea of the improvements which Spearfish would bring over Tigerfish?

(Mr Jackling) Yes, I think I can say it will bring improvements in every respect. If you characterise the torpedo as comprising propulsion, guidance and warhead, the successor torpedo would be more capable in every respect, in terms of range, manoeuvrability, guidance and the warhead.

702. And speed?

(Mr Jackling) And speed, yes.

703. You have said that extensive modification to existing systems are required with the introduction of Spearfish. Does that mean a cost penalty?

(Mr Creighton) Not so much a cost penalty, the consequences of introducing Spearfish are th

[**Chairman** *Contd*]
there are changes needed to the existing SSNs to handle Spearfish. Future SSNs clearly will be designed to handle Spearfish from the beginning, and Trident submarines have been designed to handle Spearfish, and the Upholder class for carrying that weapon.

704. Is there an operational penalty for the greater weight of Spearfish?
(Mr Creighton) There is not a submarine operational penalty.

Mr Cartwright

705. Could I raise the issue of submarine-launched cruise missiles? In the light of the US experience in the Gulf war, is any consideration being given by the Royal Navy to having submarine-launched cruise missiles on SSNs?
(Mr Jackling) I think the answer is no. Obviously we follow the development of this capability in other navies. Submarine-launched cruise missiles are essentially for engaging land targets and within our own force structures that is a role where the Royal Air Force is in the lead. It is something that obviously in practical and conceptual terms could be done, but only at the expense of the capability of our submarines for other tasks, and the tasks for which they are intended at present. Our Allies have this capability and it is not one that we seek to acquire for ourselves in the light of that.

706. You do not feel with a force of only 12 SSNs this would be an added benefit, in the sense of widening their capabilities?
(Mr Jackling) No, we do not. As I said, I think one could only install that capability in SSNs at the expense of the capability for ASW discovery operations, and that is what they are there for.

707. Could I raise the issue of mine-laying. Can you tell us how old the Mark 5 groundmines in RN service are, and how effective they are against modern mine-counter measure systems?
(Mr Creighton) There is in fact a groundmine up-date programme which will modernise the electronics of the existing mines. Most of them date from about the 1970s, although I believe some are older.

708. Are they vulnerable to the modern sweep and hunting systems?
(Mr Creighton) With the up-date programme in place, they will be very effective mines. The initial work in developing the electronic packages for that has been completed and we are in a position, subject to programme constraints, to place further competitive tenders for that work once the approvals are given.

709. With an in-service date expected of what?
(Mr Creighton) I cannot give you the in-service date in open session, I am afraid.

710. Could I ask, on the general issue of mine-laying, what sort of priority mine-laying receives in terms of exercising and training in the submarine service?
(Commodore Blackham) All submarines, Mr Cartwright, exercise and practise mine-laying as part of their workload.

Chairman

711. Does it have a high priority or is it slightly the poor relation. Is it given a great priority in the training programmes?
(Commodore Blackham) It is regarded as important.

712. You told the AFPRB in 1990 of "a serious deterioration in the manning position of all levels, ranks and rates, within the submarine service." Is it still that bad?
(Mr Moss) Mr Chairman, as I think you have been told, the policy for manning the submarine service is to man it 100 per cent and we achieve that fully in boats at sea. In the remainder of the submarine flotilla there is just a tiny share of the service----

713. I am going back to your words last year, your submission to the AFPRB and those were your words, "a serious deterioration in the manning position of all levels, ranks and rates, within the submarine service" Now what I am saying is that still the position or has it got better or has it got worse?
(Mr Moss) The problems in the manning position are mainly in the overall qualifications and training.

714. You were very specific about this. Let me refer you to paragraph 58.
(Mr Jackling) Maybe I can help. Although I do not recall that piece of evidence myself----

715. I just left the first three words out of it, "This year the MoD has told us of a serious deterioration in the manning position at all levels, ranks and rates, within the submarine service."
(Mr Jackling) Yes, I think that refers to what we expect to be the consequence of the current levels of PVR, in other words supply and demand. It does not say that the submarine service is other than 100 per cent manned because it is and always has been while at sea but because of the rates of PVR that were then emerging we did make recommendations to the AFPRB for measures to combat that and in fact there is evidence that the recent award has contributed to improving that situation.

716. So the situation has got better?
(Mr Moss) In response to that evidence, Mr Chairman, the AFPRB made recommendations which the Government accepted for very significant steps to improve the pay in the submarine service.

717. I only picked you up, Mr Moss, because you started by saying everything was fine.
(Mr Moss) You asked me about the manning, Chairman, and I said because we move people in to fill the gap the bodies in post are there but Mr

[**Chairman** *Contd*]
Jackling is quite right that we have been concerned about the number of people wanting to leave the submarine service and the AFPRB, endorsed by the Government, have made a very significant step.

718. Given that you have had it for officers, why have you not kept PVR figures for submarine service ratings?
(Mr Moss) We are beginning to put ourselves in that position, Mr Chairman. Our problem is that the software does not at the moment distinguish between submarine ratings and the rest within the figures for the service.

719. That will change soon?
(Mr Moss) Yes.

720. What is the current justification for submarine pay?
(Mr Moss) There are four justifications. First and most obviously is job evaluation the actual submarine job; then an incentive to maintain people in the service; an incentive to recruit people into it; and compensation for the uncomfortable conditions of living in a submarine.

721. Have the entry targets for 1990/91 which you state in answer A.c of your Memorandum[1] been met?
(Mr Moss) Yes, they were met in full, Mr Chairman.

722. The entry targets were 672 ratings and 67 officers?
(Mr Moss) That is right.

723. You met those targets in 1990/91?
(Mr Moss) Yes we have, Mr Chairman.

724. Can you confirm that the guarantee of full manning of submarines will be maintained under Options for Change?
(Mr Moss) That will remain our policy, Mr Chairman. If I may add the simple practical fact that in a surface ship one can afford to leave certain posts gapped and in submarines one cannot.

Mr George

725. Can I ask for some advice on the MoDs's proposal for the training and education of submariner engineers. I am asking that in the light of the fact that I understand that there is likely to be some rationalisation of Shrivenham and Manadon. I just wondered what the current thinking was of how you proposed to train specifically dedicated engineers in the submarine service?
(Mr Jackling) The Navy's thinking, Mr George----
(Mr Moss) I do not think I can anticipate a decision that Ministers will in due course reach on which work is going on at the moment.

(Mr Jackling) Mr George, if you wanted to pursue the question of what the training comprises and how we saw it continuing in the future, I am sure that Mr Moss can speak to that because there is a good deal of information. If you were asking whether as part of our overall look at support to all three armed services in the future and in relation to the new force structure there are possibilities of rationalising on a bi or tri service basis I am afraid that we cannot give you any information except to say that the Defence Secretary's intention, which he made quite clear in his July Statement, and has made clear since, is that the support area would be rationalised and slimmed down and made more cost-effective at least in proportion to reductions in the front line. Clearly that requires us to look right across the board to maximise and extend best practice to rationalise facilities where the burden of all the considerations points to that being the right thing to do and in that context it is clearly a possibility that we will address the question of whether concentrating particular kinds of training on the training establishment of one service, which seems to be best placed to provide it, would be the right thing to do. It is a consequence of the period we are in at the moment in relation to Options, that there are many ideas which are surfacing and being considered. We are being asked to be as imaginative and radical and wide-ranging as we can because the objective of reducing expenditure and support in relation to the reduction in the front line is a very testing one not least because I think the Ministry would claim to have been pretty rigorous and successful in the past in reducing its costs where it could in the support area. So as a result of this requirement to look for savings to the maximum we are not neglecting to consider anything.

726. Just a brief follow-up. I understand that there is some form of inquiry into the future of Shrivenham and Manadon and engineering education. Is it possible for us to know what the terms of reference are and when that committee is likely to report and whether that will be made public?
(Mr Jackling) Chairman, can I consider that. It is all part of the wider question. It is not easy for us to give you detail of particular steps as they unfold or as they emerge but obviously we would like to give you what we can. So can I take that away?

Chairman

727. Can I go back to the question that I asked before about the targets, the 672 ratings and the 67 officers which you achieved. How many were volunteers?
(Mr Moss) I have not got the volunteer figures for that particular entry but all officers in these areas are volunteers and roughly about three-quarters of the ratings.

728. Has that position with regard to ratings improved since the new arrangements were made?
(Mr Moss) The new pay arrangements, Chairman?

729. Yes.

[1]See evidence p.32.

[**Chairman** *Contd*]

(Mr Moss) I am not aware of it and it is scarcely likely to show yet as the rates have only been in place for 16 days.

730. But the prospect of it, you had a problem and went to the AFPRB and said, "We have not got the staff, we need money," and you got the money. Has that been successful?

(Mr Moss) We are hopeful, Mr Chairman.

(Mr Jackling) We are confident, Mr Chairman!

(Mr Moss) It is quite clear that the service at large has welcomed the Government's approval of those recommendations. It is a bit early to look for specific benefits showing themselves already in the submarine service, and I would mislead you if I said they were. There are grounds for reasonable optimism but I have no figures to support that.

731. Is there a problem with finding enough berths on SSNs for submarine Part III training?

(Mr Moss) Yes.

732. How many Part III trainees are currently on the Jetty waiting?

(Mr Moss) About one-third. We have a total of about 660 submariners undergoing Part III training, and only about 440 of those are in submarine billets at the moment.

733. How serious is that problem?

(Mr Moss) It is a backlog we would like to eliminate as soon as possible. As you realise, there are difficulties in removing it quickly. The speed at which we can get it down to a steady state figure, which is about a couple of hundred, must depend on the programme of paying-off, the benefits of the pay award and other factors in improving the PVR rates. Yes, it is serious.

734. Have you considered easing the problem by delaying the paying- off of some submarines?

(Mr Moss) Mr Jackling indicated that the relevance of that point would be borne in mind in the planning and preparation of decisions yet to be taken.

735. But it is a problem which you want to solve?

(Mr Moss) Yes, Mr Chairman.

736. There is a particular shortage of submarine commanding officers, why is that?

(Mr Moss) If I may correct you, all submarines----

737. ---- have commanding officers, you are going to tell me!

(Mr Moss) You are right! There is in the submarine service a shortage of submarine command qualified officers. All sea billets are filled by appropriately qualified submarine officers; billets which require command qualifications are filled by officers who have them. But there are a number of shore billets which should ideally have command qualified officers but they are filled by officers with a lower standard of qualification but an acceptable one.

738. Why has this problem arisen?

(Mr Moss) It is part of the manning problem which we were talking about earlier, that we have lost people from the submarine service. The posts are manned but we have yet to build up to the desirable level of the number of officers with command qualifications.

739. How do you propose to tackle that?

(Mr Moss) There are a variety of measures we can take. We can give acting higher rank to, for example, young lieutenants who have got through command qualification courses; we can put them up to acting higher ranks, to lieutenant commanders. We can use overzone lieutenant commanders with similar acting higher ranks in commanders posts.

740. Are you doing these things? Are they desirable from the Navy's point of view?

(Mr Moss) They are acceptable.

741. Let us have a senior officer's view.

(Commodore Blackham) They are clearly undesirable but they are acceptable.

742. Because they have to be accepted?

(Commodore Blackham) Exactly.

743. So we are in an undesirable state of affairs with under-qualified officers in shore billets?

(Mr Moss) Yes.

744. This will mean, will it not, the general standard falling?

(Mr Moss) Under-qualified? They are not as qualified as we would wish but the qualifications----

(Mr Jackling) Not ideally qualified.

(Mr Moss) Thank you, Mr Jackling.

745. So what do we do about this lowering of standards?

(Mr Moss) You have referred to pay awards as an important step. That will, we trust, bring the numbers in.

(Mr Jackling) Can I say about this that it was clear from the evidence we gave to the AFPRB on this year's award that this was one of the problems which we wish to address with the targeting of pay measures. The AFPRB has made recommendations which seek to achieve exactly that; the Government has funded the award in full for implementation from 1st April with no staging, and I think the combination of the evidence we gave to the AFPRB and the ready acceptance of their recommendations by the Government is evidence enough that we are doing what we think ought to be done to correct this problem. We do not yet have evidence of the result, and I do not think you would expect it just yet.

746. But it is not just pay. What effects have you been able to observe on morale, and on PVR rates, of the proposed cuts?

(Mr Moss) I did indicate, Chairman, a moment ago that the PVR figures showed just the first

[**Chairman** *Contd*]
indication of an improvement, and we will be monitoring that very closely.

747. Is that a real improvement or improvement against a projected reduction?
(Mr Moss) An improvement is an improvement, Chairman.

748. No, I beg your pardon, it is not. If you only need half the number of submariners, you could say you are improving the position by adding nothing.
(Mr Moss) The notices to quit are declining, so that is an improvement.

Sir Barney Hayhoe

749. Are the career prospects of submariners going to be adversely affected as a result of a reduction in the number of submarines? Is that therefore having an impact upon people volunteering for submariner service?
(Mr Jackling) The career structure of all three services is clearly going to be affected by the Options proposals. The reactions of individuals to that prospect is something that will emerge over time and as the proposals are turned into final decisions, and will vary very much with parts of the service. All I think it is fair to tell you today is that such indications as we have, both from informal soundings and more formal surveys of attitudes, is that the prospect of the Options force structure has not been damaging to morale. The rationale for the changes envisaged by the Government is understood, the fact that all three armed services will continue to represent a significant capability and offer a very rewarding career is also clearly understood, and I think the armed forces will have attached importance to one of the major objectives of the Defence Secretary in this work, that as the services grow smaller they should continue to be well-equipped, well paid and well-housed and all that; that they should have a role that is worthwhile and with a good and fulfilling career. That is rather a long answer but what I want to leave with the Committee is an optimistic impression of the impact of these proposals on thinking.

Chairman

750. Would you care to make any public comment on the radiation exposure figures for 1990 which you have provided for us, showing disappointingly high figures for DEFIANCE and NEPTUNE?
(Mr Heyhoe) Those figures are higher, Chairman, certainly as you say. The reasons are that there is a larger number of people dealing with the problem that we have.

751. What is your forecast for this?
(Mr Heyhoe) I am not in a position to make a forecast, I am afraid, but I can say that we are taking this very much into account and we have set up a special group to monitor the situation and minimise the dosage.

752. Are we at the worst of the problem, or is there still more to come? Are we over the worst?
(Mr Heyhoe) I cannot say, I am sorry, I do not know. I can ask for an explanation to be given, if it would be helpful to the Committee.
Chairman: Finally, I would like to turn to the vexed question of the fishermen and their nets, and the submarines which pass under them.

Chairman

753. You gave us some information on the 16 incidents in the last decade, two of them in the South West, six in the Irish Sea and only four in the Clyde area. The further trials of the pinger devices were to take place in March and April. Have they?
(Mr Jackling) Could I turn to Mr Bonner to answer that.
(Mr Bonner) Perhaps, Mr Chairman, I might preface my remarks by placing on the record the deep regret of the Ministry for the tragic loss of life that took place last November and our determination to take steps to ensure that as far as possible ncthing similar will happen again. We have just received yesterday the report from the Admiralty Research Establishment based upon the trials which took place and on scientific work which they have carried out on these pinger devices. We need to consider that report now in conjunction with the Department of Transport who, of course, take the lead on maritime safety matters but broadly the conclusions of that report do seem to be fairly encouraging. We will be taking a decision in the light of that work about further trials, but it still is as we reported to the Committee in January our intention that such trials should take place.

754. But not in March or April? How much has it been delayed and why the delay?
(Mr Bonner) I think, Mr Chairman, in our enthusiasm to make rapid progress in the immediate aftermath of the ANTARES incident we have perhaps underestimated the amount of work that needed to be done. Acoustic underwater propagation is a complex area of science and there are various variables that need to be considered and we need to look at sonar and pinger performance under a wide range of circumstances and environmental considerations if the submarine service and the fishing community are to have confidence that these measures will prove effective.

755. I woult like to press you a little bit on that delay because, as I understand it, there are off-the-shelf products which have been offered to you for testing. So why does it take three months to consider whether or not you will test them? Can you not test them all and see which ones work?
(Mr Bonner) Practical tests enable us to assess the performance of these devices in the particular area and under the particular conditions in which those tests take place but the performance of those devices is going to vary according to the depth of the water, the quality of the bottom of the sea, the sea state and sea temperature and really we need to

[**Chairman** *Contd*]
have confidence when we come to a final conclusion about the specification of such a device that it will be the best to deal with the very wide range possible environmental conditions.

756. So you are deciding on the ideal before you see whether what is on offer will work?
(Mr Bonner) We want to make sure that before we reach any decisions about specifications for a new device that it will be as effective as possible, yes.

757. So I am right. You are deciding on the ideal solution before you are seeing whether any of the ones that are ready now will be satisfactory?
(Mr Jackling) Chairman, you must have a set of criteria against which to judge the effectiveness of a potential system.

758. One way to solve the problem is to say "Let's have a look at what we have got," is it not, rather than going and inventing the wheel. The point of the question is this is a new solution and companies, as I understand it, because they have approached other Members of the Committee have said, "Look, we have got absolutely the right answer," and you are saying, "We have got to know what the right answer is before we try to see whether you have got the right answer." Is that the position?
(Mr Bonner) I think what I am saying, Chairman, is before we can confirm that the companies have got the right solution we need to be able to assess the performance of that device under a very wide range of conditions.

759. In a trial?
(Mr Bonner) It is that work which has ust been completed at the Admiralty Research Establishment and which we are now assessing.

760. Before trying it, although it is ready to be tried? Maybe I have got this wrong.
(Mr Jackling) I think Mr Bonner has described the trial.

761. I cannot see the reluctance in taking a thing that companies are offering you and saying, "This is the answer," and putting it on the nets and testing.
(Mr Jackling) We are testing.

762. I thought Mr Bonner was saying you could not put it on trial before deciding what the solution was which has been a fault of the Ministry of Defence in the past, which is perhaps why I ask the question.
(Mr Bonner) We carried out trials in December of the equipment provided by Seametric and it is our intention to carry out future trials which will enable other manufacturers to display the effectiveness of their equipment.

763. That is what you had planned to do in March or April?
(Mr Bonner) That is right.

764. Why has that been delayed?
(Mr Bonner) Because of our wish to look at the performance of these, or assess the performance of these, devices under a wider range of environmental conditions.
(Commander Collins) The parameters which were proposed by the various companies for the design of a pinger are the self-same parameters which have been used in two trials. However, as Mr Bonner has intimated, there are dangers that if those parameters are set at the wrong levels, the use of such pingers could actually make the situation a great deal worse The water conditions for the various areas that we are considering are very diverse and very difficult to analyse. The analysis time which has been taken in putting together the computer models to make certain that the levels at which these various settings are set for computer trials, will actually benefit the situation rather than make it worse.

Mr Home Robertson

765. This is obviously not a brand new problem, it is a long-standing problem and it is a matter of grave concern among the fishing communities in Scotland and elsewhere, and indeed among submarine crews and people we have been speaking to in the course of this particular inquiry. I am sure everyone appreciates the concern you have expressed and the enthusiasm you have now expressed, but I must say I wished you had started a long time ago. Will you publish the report you have just referred to?
(Mr Bonner) We have not taken any decision on that yet.

766. For goodness sake! This is a matter of life and death. It is matter of great public concern. Can we press you to consider publishing that report?
(Mr Bonner) Whether or not we publish the report, it will be our intention at some stage to consult the Scottish fishing communities about the way in which we intend to proceed.

767. How much have you spent so far on this programme?
(Mr Bonner) I think the position as of January was some £10,000. That figure will be higher now but I do not have an up-to-date figure.

768. When would you expect to be in a position to produce guidelines for the use of this type of equipment, and do you give any thought to the policy for the supply and maintenance and indeed the fitting and the provision of pingers?
(Mr Bonner) We have given some thought to these things, but we have really been waiting for the scientific report which only arrived yesterday. We are well seized of the need to try and move this as quickly as we can.

769. I am certainly baffled by this because some of the submarine officers we spoke to earlier indicated they have been involved in these trials and

[**Mr Home Robertson** *Contd*]
were well satisfied that the equipment which was being used seemed to be working very well indeed. So why are you delaying this?

(Mr Bonner) I think the trials themselves went satisfactorily, but there was subsequent scientific work to look at conditions which could not be tested in the trials themselves.

770. A final detailed point on the pinger question: are you yet in a position to give an indication of what the cost of the type of equipment you have been testing would be, and whether the bills will be met by MOD or the fishermen concerned?

(Mr Bonner) I am not, but clearly that is something we have under consideration.

771. Is it thousands of pounds or hundreds of pounds per unit?

(Mr Bonner) We do not know yet.

772. You do not even know that much?

(Mr Bonner) Because that will depend on the specification of the equipment.

Chairman: I think it is fairly clear it is a cost which would not be borne by the fishermen.

Mr Home Robertson

773. I hope so.

(Mr Bonner) I think decisions on that have to be taken.

Chairman

774. But that is the thinking, is it not?

(Mr Bonner) We are certainly well aware of the views of fishermen, and that is something which Ministers will take into account.

Chairman: I think that I agree with Mr Home Robertson that I hope you are aware of the feeling that there is an urgency but I fully take the point that one must not make a bad situation worse. I would just like to declare an interest, non-commercial. I am the Chairman of the Security Committee for the British Irish Inter-Parliamentary body. This issue raises the question of the Irish fishermen. Is there any reason you can think of, if this was made available to Scottish fishermen, that it could not be made available to Irish fishermen as well?

Mr Home Robertson: Or even English fishermen!

Chairman

775. I will rephrase the question. If it were made available to United Kingdom fishermen, could it be made available to Irish fishermen as well, in principle?

(Mr Bonner) If it was commercially available there would be nothing to prevent any fisherman buying it.

776. If this is a system that is going to be provided by the Ministry of Defence to ensure the safety of fishermen that is another matter. Would you see a difficulty in principle of extending this provision to Irish fishermen as they are in the same stretch of water?

(Mr Bonner) No difficulty in principle at all.

Mr Home Robertson

777. Now that the advance notification scheme on the Clyde has been in operation for some time, can you comment further on how that is running from your point of view and the possibility of its extension to other areas in Scotland and elsewhere?

(Mr Bonner) We are very satisfied with the way the notification scheme is working and we are looking at the feasibility of extending it to other areas and we hope to be in a position to take a decision on that by about the end of June.

778. Finally, it is now almost 5 months since the board of inquiry report into the tragic loss of the ANTARES when the entire crew of that boat from Carradale was lost in November. It is almost 5 months since that report reached Ministers. Mr Hamilton said on the 23 November that "we will ensure that the report is produced as soon as possible." When is that going to be made available?

(Mr Bonner) I cannot, of course, speak for the report being drawn up by the Marine Accident Investigation branch of the Department of Transport. As far as the Navy's own internal inquiry is concerned that has reported and the report is now with the Ministry of Defence and I would hope that we could make available a summary of the findings in the not too distant future.

779. Weeks, months?

(Mr Bonner) I think we are talking about weeks rather than months.

780. Days?

(Mr Bonner) Weeks.

(Mr Jackling) Chairman, can I just go back. I think I understood you to be asking at the very end of your exchange with Mr Bonner whether there would be any difficulty about other fishermen acquiring whatever is the product of this competition. To that the answer is clearly no if it was commercially available but I would not like you to draw the conclusion tha we gave you any sense that the Ministry of Defence would fund the acquisition of this to fishermen other than United Kingdom fishermen.

Chairman

781. In principle, if arrangements are made for UK fishermen, there would be no objection - if all other things were equal - to this being made available to Irish fishermen as well?

(Mr Jackling) If you comprehend "arrangements" as the fitting of the device, absolutely, but if you comprehend "arrangements" as the financing of the fitting of that device, that is something different.

Chairman: Thank you, gentlemen. It has been a useful session and we are grateful to you for your patience in answering our questions. Thank you.

WRITTEN EVIDENCE

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

1. Memorandum submitted by the Ministry of Defence (22.2.91)

OPTIONS FOR CHANGE: SUBMARINES

Personnel

A. (a) What is the current establishment and strength of the submarine service, including shore-based support services, broken down by specialisation and sub-specialisation? How many of these posts in each category are held by qualified submariners? What is the approximate proportion of qualified submarine personnel required to each submarine drafting billet?

A. (a) The audited establishment (requirement) and strength (bearing) for the submarine service is as follows:

	Category	Requirement	Bearing
Officers: (at) 1/12/90)	Commander (X)	87	67
	Commander (E)	114	115
	Lt Cdr and below (X)	370	306
	Lt Cdr and below (E)	469	554
	TOTAL	1,040	1,042
Ratings: (at 1/10/90)	Coxswain	74	67
	Ops (Sonar)	826	790
	Ops (TS)	511	453
	Radio Operator	350	321
	MEM (M)	958	1,017
	MEM (L)	539	518
	WEM (O)	582	607
	Ops (UW)	0	18
	WEM (R)	263	289
	Cook	222	206
	Stewart	155	138
	Stores Accountant	145	134
	Writer	68	58
	Medical Assistant/Technician	114	95
	MEA (ML)	674	685
	MEA (EL)	466	485
	WEA (ADC)	61	43
	WEA (AD)	184	230
	WEA (CEW)	144	155
	WEA (WDO)	143	90
	WEA (WD)	266	240
	WEA (OC)	138	176
	TOTAL	6,883	6,815

The number of posts in each category held by qualified submariners is as follows:

	Category	Number Qualified
Officers: (at 1/1/91)	Commander (X)	67
	Commander (E)	115
	Lt Cdr and below (X)	223
	Lt Cdr and below (E)	465
	TOTAL	870

The number of posts in each category held by qualified submariners is as follows:

	Category	Number Qualified	
Ratings: (at 1/12/90)	Coxswain	76	
	Ops (Sonar)	718	
	Ops (TS)	407	
	Radio Operator	288	
	MEM (M)	864	
	MEM (L)	402	
	WEM (O)	500	
	Ops (UW)	0	
	WEM (R)	219	
	Cook	178	
	Steward	120	
	Stores Accountant	114	
	Writer	47	
	Medical Assistant/Technician	81	
	MEA (ML)	1,158	(Numbers in each sub-category are not readily available)
	MEA (EL)		
	WEA (ADC)		
	WEA (AD)		
	WEA (CEW)	958	
	WEA (WDO)		
	WEA (WD)		
	WEA		
	TOTAL	6,123	

Where the numbers qualified exceeds the bearing, the difference is due to trainees entering the trained strength between 1 December 1990 and 1 January 1991 for Officers and 1 October 1990 and 1 December 1990 for Ratings. Where the bearing exceeds the numbers qualified, the excess are under or are awaiting submarine training.

The proportion of qualified submarine personnel required to each billet is 1:1. There are no planned manpower gaps in operational seagoing submarines.

A. *(b) Reference was made in evidence on 5 November to particular areas of skill with which there are difficulties (Q.458). It would be helpful to have details of these as they apply to submarines, and to submarine support tasks.*

A. (b) Three areas are causing some concern. They are:

Submarine Seaman Officers

Charge Chief Marine Engineering Artificers qualified as Nuclear Chiefs of the Watch (Nuclear propulsion plant operators)

Medical Assistants (Submarines)

A. *(c) What was the target for (i) rating and (ii) officer entrants in 1990; and what proportion of those entering the service have been volunteers in those recent years for which figures are available?*

A. (c) Entry targets for 1990/91 are:

(i) Ratings 672 (143 Artificers, 529 Non-artificers)

(ii) Officers 67 (32 X, 14 ME, 9 WE), 8 Supply, 4 Medical)

The proportion of volunteers are:

(i) Ratings approximately 75 per cent

(ii) Officers approximately 100 per cent

A. *(d) What is the current PVR rate for ratings and officers on the trained strength? What evidence has been gathered from PVR applications since July 1990 on the impact of the Options for Change proposals?*

A. (d) PVR rates for submarine officers as at 1 October 1990 were as follows:

Lt Cdr (X)	1.9%
Lt (X)	6.3%
Lt Cdr (MESM)	9.0%
Lt (MESM)	10.0%
Lt Cdr (WESM)	2.7%
Lt (WESM)	9.2%

PVR application rates for ratings by submarine service are not available although figures are now being compiled and the information will therefore be available in future years.

There is currently no evidence that the Options for Change proposals are having an effect on PVR application rates.

ABBREVIATIONS

Ops	Operations Branch
MEM	Marine Engineering Mechanical
WEM	Weapons Engineering Mechanical
MEA	Marine Engineering Artificer
WEA	Weapons Engineering Artificer
MESM	Marine Engineering Submarines
WESM	Weapons Engineering Submarines
X	Seaman Branch
E	Engineering Branch
TS	Tactical Systems
M	Mechanical
L	Electrical
O	Operating
UW	Underwater
R	Radar
ML	Mechanical
EL	Electrical
ADC	Action Data Communicator
AD	Action Data
CEW	Communications Electronic Warfare
WDO	Weasons Discharge Ordinance
WD	Weapons Discharge
OC	Ordinance Control

Pay

B. What are the current rates and conditions of submarine pay? When is the next review due, and have recent events altered the timetable?

B. Submarine pay has been reviewed in the latest report of the Armed Forces Pay Review Board (AFPRB) (20th Report 1991, Cmnd 1414) published and accepted by the Government on 31 January 1991. The AFPRB report takes account of Options for Change. The next review is scheduled for 1995.

The AFPRB recommendations include significant improvements in pay for the Submarine Service; a revision of continuity rules; and a revision of career break points. Current rates of pay and rates effective from 1 April 1991 are below. The current published conditions of service (BR1950) and an extract from the AFPRB report explaining the changes which have been agreed to the pay and conditions of service frm 1 April 1991 are attached at Annex.

Current Rates of Pay

Special Service Pay (Submarines) (SSSM)

	Daily Rate 1.1.91	Daily Rate 1.4.91
Midshipman, Able Rate and below	6.28	7.35
Leading Rate and Petty Officer	6.87	8.05
Acting Sub Lieutenant, Sub Lieutenant (except Special Duties List), Chief Petty Officer and Warrant Officer	8.18	9.60
Lieutenant to Captain and all SD List Officers	8.81	—
Sub Lieutenant (SD), Lieutenant (all lists until break points for 5th tier below)	—	10.30
Seaman Lieutenant on qualifying Advanced Warfare Course, Marine Engineering Lieutenant on recommendation for Deputy Marine Engineer Officer, Weapons Engineer Lieutenant on recommendation for Charge appointment, Lieutenant Commander (all lists), Commander and qualifying Captains	—	11.85

B. Nuclear Propulsion Senior Rates Supplement (NPSR)

Petty officer	CAT B 4.18	4.90
Chief Petty Officer and Warrant Officer	CAT A2 6.14	7.20

NOTE: From 1 January 1991 the NPSR supplements have been restructured to relate payment to the level of training and qualification. Cat A and Cat B are watchkeeping categories.

C. Reserve Bands of Submarine Pay after three years ashore

Ratings on tiers 1 to 3	7.05
Officers (tiers 4 and 5)	9.35

Training

C. *(a) It would be helpful to have an outline of submarine training at all stages, showing where and how each stage is carried out and the duration of such training.*

C. (a) Submariners are not recruited directly and therefore both officers and ratings enter alongside all other General Service personnel. Basic training is identical through HMS RALEIGH or Britannia Royal Naval College Dartmouth/Royal Naval Engineering College Manadon and the Fleet as appropriate. During this time men are identified as volunteers for submarine service or are drafted for submarine training. Thereafter they undergo submarine-specific training. The courses described below cover the main areas of this training and do not encompass all minor submarine sub-specialisations.

Officers

Seaman Officers

The Seaman Officer training pipeline is:

(i) Officers Training Course (OTC) at RN Submarine School (RNSMS) HMS DOLPHIN. This is a four week basic submarine course.

(ii) Nuclear General Course (NGC) 13 weeks at the Department of Nuclear Science and Technology (DNST), RNC Greenwich. This is a mandatory course for all officers who will have responsibility for nuclear reactor safety.

(iii) Submarine Basic Warfare Course (SMBWC) 6 weeks at RNSMS.

(iv) At sea training. 12 months in a nuclear submarine qualifying as a safe submariner and acquiring basic operating certificates.

(v) Intermediate warfare course. 14 weeks at RNSMS which builds on training to date and fits for first full sea appointment.

(vi) After a number of years an officer will return for the Advanced Warfare Course (AWC) 21 weeks at RNSMS which prepares an officer for senior watchkeeping posts (watchleader).

(vii) At about age 31, an officer may be selected for Submarine Command Course (Perisher). This course, which is done at various shore establishments and at sea, lasts about six months and qualifies the officer to command a submarine.

Supply Officers

Supply Officers do OTC, NGC, and SMBWC with the seaman officers and then join a submarine for their first appointment.

Weapon Engineering Officers

After completing an Engineering Degree and application training at RNEC Manadon, the Weapon Engineering Officer does OTC, NGC, and SMBWC alongside the seaman officers. He then goes to sea for six months to qualify as a safe submariner and to gain the appropriate watchkeeping and operating certificates. He then returns to RNSMS for the Deputy Weapons Engineering Officers Course. The course lasts 20 weeks and prepares the officer for his first sea appointment. Subsequent submarine training is restricted to pre-joining training (PJT) courses and a Weapone Engineering Officer (Designate) course before he becomes a Weapon Engineering Officer in a nuclear submarine. Should he be appointed to an SSBN, additional training will be required in the RN Strategic Systems School (RNSSS) at Faslane.

Marine Engineering Officers

After completing an Engineering Degree and application course at RNEC Manadon, Marine Engineering Officers go to DNST for the 26 week Nuclear Reactor Course (NRC). This is followed by a 10 week Officer Nuclear Operators Course (ONOC) at HMS SULTAN. These two courses, which are overseen by the Navy's nuclear safety authorities, are mandatory courses that prepare the officer to supervise the operation of a naval nuclear reactor as an Engineering Officer of the Watch (EOOW). After completing the courses the officer will join a submarine for a period not less than 13 weeks to qualify as an EOOW. Subsequent submarine training will be restricted to PJTs and further periods at sea re-qualifying as a nuclear plant operator at the start of each new sea appointment.

Ratings

Basic Training

All ratings complete a basic submarine course at RNSMS or HMS SULTAN (Marine Engineering only). This course last 3 weeks for junior ratings and 4 weeks for senior ratings.

Junior Ratings

After basic training all junior ratings complete short courses at RNSMS or HMS SULTAN that last for 3-4 months depending on sub-specialisation. These courses prepare the man for his first sea job. He will then join a submarine for "Part III" training lasting 12 weeks to make him a safe submariner. On completion he will be awarded his submarine badge (Dolphins). Subsequent training wlll depend on sub-specialisation but generally packages of additional training will be given on qualifying as a Leading Seaman and again as a Petty Officer. The courses are designed to prepare the man for all subsequent drafts in that rate.

Weapons Engineering Artificers (WEAs)

On completion of basic training WEAs complete a variety of courses at RNSMS and HMS COLLINGWOOD depending on sub-specialisation and the submarine to which they are being drafted. These will last from 6-9 months and prepare the man to carry out his maintenance responsibilities in an SSN. Ratings destined for service in SSBNs will carry out training lasting 6-12 months in the RNSSS at Faslane instead. On completion all will join a submarine for Part III training (cf junior ratings above). Subsequent submarine training will be limited to PJTs before subsequent sea drafts in submarines with different/new equipment fits.

Marine Engineering Artificers (MEAs)

On completion of basic training a MEA will complete a 6 week basic nuclear course at HMS SULTAN to prepare him for his first draft as a nuclear plant operator. He will then go to sea for Part III training and to qualify as a Category C nuclear plant operator. This will take 3-6 months. After a number of years he will return, usually as a Chief Petty Officer, for the nine week Nuclear Propulsion Operators Course (NPOC) at HMS SULTAN which prepares him to become a Category B nuclear plant operator. Qualification at sea follows. After another period of years he may return again for the 21 week Nuclear Propulsion Charge Course at HMS SULTAN which will prepare him to become a Nuclear Chief of the Watch, a nuclear plant supervisory task (average age 25-30). Again full qualification at sea follows. All of these courses, and the sea qualification periods, are mandatory and are overseen by the nuclear safety authorities. Some of these men will receive specialist craft and equipment training during their careers, for example as nuclear welders or reactor instrumentation maintainers.

C. *(b) It would also be helpful to have a broad description of pre-commissioning and work-up training (i) for new construction submarines entering service and (ii) for submarines re-entering service after periods of maintenance or refit.*

C. (b) The training package is very similar for new construction submarines and submarines emerging from major refit.

The package of pre-commissioning and work-up training depends on the class of the submarine. After a docking and essential defects period (DED), which generally lasts 14 weeks, the period of training is slightly shorter. The initial training period for both new build and refitted submarines include trials of onboard newly fitted or recently maintained equipment.

An initial period of sea trials is conducted on completion of major maintenance or build. The length of time spent on these trials varies from two months for new build and refitted submarines to three weeks after a DED. In addition the ship's company undertakes basic safety training lasting five days.

On completion of trials, the submarine will undergo a dedicated training period lasting approximately forty days. During this period the crew will conduct training that is designed to mould the ship's company together as a team. It includes: harbour training, safety training to deal with mechanical system failure or fires, propulsion drills, sensor operations, warfare skills training and weapons firing. This training is split into separate periods, each one of which concentrates on different aspects. All facets are brought together in an operational assessment in the final few days. On completion of the work up training the submarine is declared fully operational.

Basing and support

D. *(a) The Committee was told that several Oberon class submarines were not based at Dolphin [Q380], and was offered further information on expenditure to date on training and other facilities at Dolphin [Q387]. It would be helpful to have a full account of current basing arrangements for RN submarines, the number of associated married and single quarters, and the associated maintenance and support facilities.*

D. (a) The total expenditure on capital facilities for training over the past 20 years at HMS DOLPHIN amounted to around £250 million of which around £30 million was for UPHOLDER. Historical information on investment in other facilities at DOLPHIN is not readily available since a large number of works and other projects were involved. Since about 1985, however, it is estimated that around £10 million has been spent on facilities for UPHOLDER other than training facilities.

The following information is correct as at 30 January 1991.

Submarine basing

(i) HMS DOLPHIN (Gosport):
Submarine Squadron 1 (SM1); 6 patrol submarines (SSK)

(ii) HMS DEFIANCE (Devonport):
Submarine Squadron (SM2); 9 fleet submarines (SSN)

(iii) HMS NEPTUNE (Faslane):
Submarine Squadron 3 (SM3); 4 fleet and 2 patrol submarines
Submarine Squadron 10 (SM10); 3 POLARIS submarines (SSBNs)
Sea Training Squadron; submarines are based here temporarily while undergoing operational training or for the training of submarine Commanding Officers (including Foreign and Commonwealth).

Associated married and single quarters

The RN allocates neither married quarters (MQs) nor single accommodation to ships or submarines, but to servicemen and women who require the accommodation. Thus, it cannot be stated that particular numbers of MQs and single accommodation are "associated" with the basing of submarines. Furthermore, in the case of single accommodation, rooms may be re-allocated when vacated by men absent on a long patrol; there is not, therefore, necessarily a correlation between the number of submarines based in a port and the number of bedspaces occupied there by submariners.

It is, however, possible to give a snapshot of the usage of service accommodation by submariners of all ranks at 30 January 1991:

HMS DOLPHIN	218 MQs and 372 single allocations
HMS DEFIANCE	208 MQs and 681 single allocations
HMS NEPTUNE	349 MQs and 994 single allocations

Maintenance and support facilities

HMS DOLPHIN

(i) Maintenance:	Limited repair facilities for SSKs. DED facilities for SSKs in FMRO Portsmouth.
(ii) Support:	Submarine school, incorporating command team trainers, ship control trainer and underwater escape tank.

HMS DEFIANCE

(i) Maintenance:	Fleet maintenance base for SSN/SSKs. Refit and DED facilities for SSN/SSKs at Devonport Dockyard (DML).
(ii) Support:	Command team trainer; ship control trainer; reactor instrumentation trainer.

HMS NEPTUNE

(i) Maintenance:	Floating dock; facility for nuclear work.
(ii) Support:	Naval technical department; reactor instrumentation simulator; command team trainer; ship control trainer; strategic systems school; TRIDENT support facilities.

ROSYTH DOCKYARD (BTL):

Refit and docking facilities for SSBN/SSN/SSK (including new TRIDENT facility).

D. *(b) It would also be helpful to have details of the options currently available for supporting each class of submarines in i) long refit; ii) d.e.d. and iii) capability update work.*

D. (b) The options for the types of work in categories i), ii) and iii) for each Class of submarine are as follows:

SSBN (RESOLUTION Class)	i)	Rosyth Dockyard
	ii)	Rosyth or Faslane floating dock
	iii)	Rosyth or Faslane floating dock
SSN (all classes)	i)	Rosyth or Devonport
	ii)	Rosyth, Devonport or Faslane
	iii)	Rosyth, Devonport or Faslane

SSK (OBERON Class)	i)	no more planned
	ii)	Rosyth, Devonport, Faslane, Portsmouth or suitably qualified private yards
	iii)	Rosyth, Devonport, Faslane, Portsmouth or suitably qualified private yards
SSK (UPHOLDER Class)	i)	Rosyth, Devonport, Portsmouth or suitably qualified private yards
	ii)	Rosyth, Devonport, Portsmouth or suitably qualified private yards
	iii)	Rosyth, Devonport, Portsmouth or suitably qualified private yards

D. (c) *The Committee wishes to know if there are any plans to develop submarine depot ships to facilitate flexible deployment and to have details of the possibility of use by RN submarines of facilities in friendly countries.*

D. (c) There are no plans to develop submarine depot ships to support submarines, whether SSBNs, SSNs, or SSKs. Their inherent endurance caters for flexible deployment. Submarines do, on occasions, operate from US ports as dictated by the needs of joint UK/US trials and exercises. They also visit friendly countries in Europe and further afield.

D. (d) *What percentage of operational defects for sea-going submarines were adjudged to be stores-related over the most recent period for which figures are available, and what has the trend in such figures been over the past five years?*

D. (d) Operational defects are not categorised in this way but according to the severity of the operational consequences of the defect. It is not therefore possible to provide the information requested. RN submarines carry a wide range of stores and equipment intended to allow them to complete their mission before returning to port where any further necessary stores will be provided.

Tasks

E. *Reference was made at the 5 December evidence session† to SSN SSK wartime and peacetime tasks [Qq 409ff]. The Committee wishes to have such tasks itemised, showing in each case whether SSNs or SSKs are specifically earmarked, and indicating which tasks will be reduced or abandoned.*

A.

War tasks

These could include:

a. Anti Submarine Warfare
b. Anti surface ship operations
c. Minelaying
d. Surveillance and intelligence gathering operations
e. Training of own forces (ships, submarines and aircraft)

All tasks can be undertaken by both SSKs and SSNs. However, submarines are not earmarked for specific tasks in war. Tasking will depend on the scenario, availability and many other factors.

In general, however, because of its smaller size, greater manoeuvrability at slow speeds, and ability to operate in very shallow water, the SSK will be more likely to undertake operations carried out close to shore, such as minelaying and surveillance, whereas SSNs, with their greater range, speed and endurance, are more suitable for anti-submarine and anti-surface operations at longer range.

No tasks have been abandoned as a result of Options for Change. However, the number of hulls required in the longer term was based on an up-to-date assessment of the threat in the light of the changed circumstances in Europe. This permitted a reduction in numbers.

Peacetime tasks

The principal peacetime tasks for SSNs and SSKs are:

a. Simulated war patrol operations for training purposes
b. Training of own forces (ships, submarines, and aircraft)
c. Trials in support of new equipment.

Again, SSKs and SSNs can undertake all tasks, but SSKs are more suitable for operations and training close inshore, and SSNs for tasks at longer range; again, submarines are not specifically earmarked for individual tasks in peacetime.

No tasks are being abandoned as a result of the post-Options force levels; training of own forces tasks will, however, be reduced in line with changed submarine and other force levels.

F. *The Committee is regularly provided with the Fleet Operations Programme. It would be most helpful to have the equivalent, in retrospect only, for SSN and SSK submarines for the most recent practicable period of 12 months.*

†See HC 266 of Session 1990-91, page 11.

A. Attached is the Fleet Operations Programme for SSNs and SSKs for calendar year 1990. The FOP is a prediction of the future employment of vessels, and insofar as is possible while MOD staff are engaged in more immediate activity at present it has been amended in manuscript to show where predicted plans changed.

* * *

Weapons etc

G. (a) *The Committee would be assisted by a declassified brief on current SSN and SSK weapons systems, including sonars and decoys, and minelaying capability. It would also be helpful to have an indication of the implications, if any, of proposed reductions for future construction and weapons outfits.*

G. (a) SSN - HMS VALIANT and HMS COURAGEOUS
These submarines have the following fit/capability:

(a) Sonar

2001—first generation, medium range, passive and active SSN bow array
2019—sonar intercept array
2046—long range, passive narrow band towed array

(b) Weapons

These submarines have six bow torpedo tubes from which TIGERFISH wire-guided, anti-submarine and anti-ship torpedoes, as well as RN Sub-Harpoon (RNSH) underwater to surface missiles, may be launched. Additionally, these tubes may be used for the deployment of M Mk 5 ground mines. The weapon outload that any submarine carries is determined and directed as appropriate to its operational tasking.

(c) Countermeasures

Countermeasures stores can be launched from two Submerged Signal Ejectors (SSE) to confuse and distract enemy sonars and weapons.

SSN—SWIFTSURE and TRAFALGAR Class

The existing weapon system of these platforms is essentially the same as that of VALIANT and COURAGEOUS. The main differences are that the S & T Class have five torpedo tubes instead of six, and a flank array Sonar 2007. Some equipment is more modern in design, giving improved performance, a reduced acoustic signature and a superior overall capability.

SSK—UPHOLDER Class

The equipment fit of this class is:

(a) Sonar

2040—bow array providing medium range passive surveillance, short range active and intercept capabilities
2041—passive ranging sonar
2046—long range, passive narrowband towed array (UPHOLDER herself is fitted with Sonar 2026 which will be replaced by 2046 at refit)

(b) Weapons

UPHOLDER SSKs have six bow torpedo tubes from which TIGERFISH wire guided anti-submarine and anti-ship torpedoes can be fired. These tubes also have a launch capability for RNSH underwater to surface missiles and M Mk 5 ground mines.

(c) Countermeasures

The submarines can launch countermeasures to confuse or distract enemy sonars and weapons.

SSK—OBERON Class

The sensor and weapons fit is:

(a) Sonar

OBERON Class SSKs are fitted with Sonar 2051, an integrated sonar suite comprising a medium range passive/short range active bow array, a medium range passive flank array, a long range narrow band towed array and an intercept array.

(b) Weapons

OBERON Class SSKs have six bow torpedo tubes from which TIGERFISH wire-guided anti-submarine and anti-ship torpedoes can be fired. Additionally these tubes may be used for the deployment of M Mk 5 ground mines.

(c) Countermeasures

The OBERON Class has similar countermeasure launch capability to the UPHOLDER Class.

The proposed reduction in force levels has no implications for future construction and weapons outfits.

G. (b) *The Committee was informed that 6 Oberon class submarines would be or had been fitted with improved sonar, following a decision in the mid 1980s [Q371-7]. It wishes to know when the decision was taken, the cost of the refit, its nature and the submarines which have been thus updated.*

G. (b) The improved sonar fit to OBERON Class submarines relates to Sonar 2051. This is a fully integrated sonar suite comprising bow passive and active array, intercept array, flank array and towed array. Sonar 2051 is part of the OBERON Class modernisation programme, which also included the fitting of a new command system, known as Outfit DCH. The decision to fit Sonar 2051 was taken in 1985.

The total cost of the main contract with the then Plessey Naval Systems (now part of MUSL) was £38 million, including VAT, and covered the provision of nine submarine sets and one shore set of equipment.

The most recent refit was that of HMS OPPORTUNE at Devonport, which was completed in August 1990. The refit included the fitting of Sonar 2051 and Outfit DCH. The total cost of the refit is estimated to be around £33 million.

Sonar 2051 has been fitted to six of the OBERON Class: OTTER, ORACLE, OCELOT, OSIRIS, OPOSSUM and OPPORTUNE. The three remaining systems were originally destined for ONYX, ODIN and ONSLAUGHT. HMS ONYX was, however, decommissioned last year and, following from Options for Change, the other two submarines have also now been decommissioned and will not now be fitted.

G. (c) *The Committee was informed that around £15 million had been committed on Upholder long-lead items [Q402] It would be helpful to have details of this expenditure and of the retro- fitting plans referred to.*

G. (c) Because of time and cost considerations a number of long lead items were ordered in 1988 and 1989 against a then expected future buy of UPHOLDER Class submarines. Such action was kept to the essential minimum. The major items involved and the sums on contract are:

EQUIPMENT	CONTRACT VALUE
New sonar suites	£12M
UK Air Turbine Pumps (ATP)	£3.0M
NATO Shipboard Inertial Navigation Systems (SINS)	£4.0M
Miscellaneous studies	£1.0M

We are considering whether it would be cost-effective to retrofit the Sonar and ATP equipments on contract into the four UPHOLDER Class boats and the SINS equipment into SWIFTSURE and TRAFALGAR Class submarines. Decisions have not yet been taken.

Refits

H. *The Committee wishes to be informed as to the intended pattern of future submarine refits, and policy as to the maintenance of two yards for that purpose.*

H. Answer D.B. gave information about the capability of individual dockyards, naval bases and the Fleet Maintenance and Repair Organisation to refit submarines. In addition, some commercial ship builders and ship repairers may have the capability to refit submarines and could in principle be invited to tender for refits and dockings in the future. Decisions on the location and timing of individual refits have yet to be taken.

The Ministry's longer term requirement for refit capacity is being considered as part of the review of the whole Naval support infrastructure following Options for Change. No decisions have yet been taken.

Sales

I. *It would be helpful to have the broad estimates of future receipts from Oberon class sales, as referred to by Mr Oughton at Q379.*

I. As the Committee have noted, HMS OLYMPUS was sold to the Royal Canadian Navy in 1989 for * This has been the only sale of an ex-RN OBERON submarine abroad. Six of the remaining 10 OBERONs to be disposed of are modernised, and, with some having residual life in them at disposal, represent reasonably good sale prospects in contrast to earlier unmodernised vessels which were in need of immediate refits and in which there is little or no interest being shown. However, we cannot guarantee sales of any boats. Buys of second hand vessels tend to be on an opportunity basis where requirement, funding, and availability of suitable product coincide. The market for new and second-hand submarines is also becoming increasingly competitive.

* * *

Of greater benefit to the UK as a whole is the potential modification/refit work which could be won by UK yards following a sale.

* * *

Costs

J. *Following the Committee's questions at Qq 407-8, some indication of the impact on unit operating costs of the decision not to procure further Upholders would be helpful.*

J. The unit operating costs of an SSK will rise in comparison with previous assumptions if only four UPHOLDER Class submarines are procured. Whilst consumption of fuel and spares would not be affected, there would be a loss of economy of scale in areas such as training personnel, maintenance of shore support and in stockholdings. Against this, we hope to reduce the level of Squadron Staff through amalgamation with another submarine squadron. The precise financial effects of these changes are not yet clear.

Research

K. *It would be helpful to have details of the current and planned research commitment into submarine warfare, including the research referred to in Qq 453-5.*

K. Research into submarine warfare is divided into a number of categories, under which work is carried out within the Admiralty Research Establishments (ARE). In addition, a proportion of this work is managed by the Sea Systems Controllerate.

ARE

Submarine research areas within ARE are:

(a) Submarine platform characteristics
This work concentrates on:
— reduction of submarine through life running costs
— * * *
— * * *
— improvement of submarine safety
— * * *
— improvements to submarine manoeuvrability

(b) Submarine sensor systems
The principal work areas are:
— development of improved active sonars
— development of improved passive sonars
— improvements to submarine localisation and classification capability

(c) Submarine weapons
The programme of research in this area is aimed at developing
* * *

(d) Submarine self-defence systems
Research within this category concentrates on:

* * *

Work is currently underway in all the areas listed above and will continue at a level commensurate with the requirements of the submarine programme. The content of the programme is kept under review in the light of technological developments or changes to the force levels and threat assessments.

The cost of the above research is just over £30 million a year of which approximately two-thirds is intramural, with the rest being spent almost exclusively with UK industry.

Sea Systems Controllerate

Within the Sea System Controllerate, the Director of Future Projects (Naval)—DFP—(N) conducts concept design or pre-feasibility studies into platform and weapon systems. Current studies include
* * *

* * *

In addition, the Director General Submarines (DGSM) manages specific research activity in the nuclear propulsion field. Principal areas of work include:

— reduction of life cycle and unit production costs
— improvements in nuclear safety
— * * *
— * * *

EXTRACT FROM BR 1950, NAVAL PAY REGULATIONS

2304. Special Service Pay (Submarines) (SSSM)

a. The rates of SSSM and SSSM(NPSR) are as follows:

	Daily Rate from 1 April 1988 £	*Daily Rate from 1 October 1988* £
SPECIAL SERVICE PAY (SUBMARINES)		
Midshipman, Able Rate and below	4·99	5·37
Leading Rate and Petty Officer	5·51	5·88
Acting Sub-Lieutenant, Sub-Lieutenant (except SD List), Chief Petty Officer and Warrant Officer	6·63	7·00
Lieutenant to Captain and all SD List Officers	7·16	7·53
NUCLEAR PROPULSION SENIOR RATINGS SUPPLEMENT		
Petty Officer	3·18*	3·18
Chief Petty Officer and Warrant Officer	3·82*	3·82

Note: The NPSR Supplement is payable under the terms of 2304m.

b. subject to Flag Officer Submarines being satisfied as to qualification, SSSM will commence for officers and ratings on completion of training in the Submarine School, HMS *Dolphin*, or on the forty-third day after successful completion of Part 1 training, whichever is the earlier. SSSM will be paid continuously from that date, subject to *d* below, until eligibility ceases in accordance with *d*, *e* and *f* below.

c. Officers and men who are eligible for continuous payment of SSSM have the notation (SM) included in their appointment or draft order immediately after the name of the ship or establishment to which they are appointed or drafted. Absence of this notation in a subsequent appointment or draft order indicates that entitlement to continuous payment of SSSM has ceased.

d. Payment of SSSM may, however, be temporarily suspended without amendment of appointment or draft for any period during which an officer or man who is considered worthy of retention in the Submarine Service is nonetheless deemed to have fallen below the required standard of efficiency for submarine duties, or who for other reasons within his power to rectify is not employable on board all submarines at sea. For officers, the decision to suspend or resume payment will be taken by MoD(Nav Sec) on the recommendation of the Flag Officer Submarines; for men by the Flag Officer Submarines or such other officer as he may designate. The decision will be communicated by letter to the paying authority and the appropriate authorities in MoD(Navy).

e. SSSM will cease to be paid to personnel in the following circumstances:

(1) On voluntary reversion to General Service—from the effective date of appointment or draft to General Service. Where voluntary reversion to General Service is consequent on a request to change branch or specialization, and a course is required before being drafted for General Service, SSSM will be retained until the end of the twenty-sixth week of the course, or the effective date of appointment or draft to General Service, whichever is the earlier. Failure on course will render personnel liable for further service in submarines and therefore SSSM will recommence from the date of failure.

(2) When permanently reverted to General Service for any other reason—from the effective date of appointment or draft to General Service. In these circumstances the decision as regards officers will be taken by MoD(Nav Sec) on the recommendation of the Flag Officer Submarines; for men, it will be taken by the Flag Officer Submarines.

(3) When unfit for submarine duties for medical reasons beyond own control:

(*a*) Those in continuous receipt of SSSM who have not reached one of the career points referred to in *f* below—after a period of 12 months from the date on which they were first checked sick, or on the effective date of appointment or draft to General Service, whichever is earlier.

(*b*) Those who have reached one of the career points referred to in *f* below, but who continue to receive SSSM in accordance with *f*(6), *g* and *h*, below — after a period of 91 days from the date on which they were first checked sick, or on the effective date of appointment or draft to General Service, whichever is earlier.

f. Continuous payment of SSSM is to cease at the following career points, beyond which there is no normal liability to serve as part complement or spare crew of a submarine in the ordinary course, or as indicated:

(1) GENERAL LIST SEAMAN OFFICERS

(*a*) If specifically not recommended by the Flag Officer Submarines for employment as First Lieutenant of a submarine.

*No Change.

(*b*) If not selected for the Commanding Officers' Qualifying Course.

(*c*) On attaining 3 years seniority as a Lieutenant-Commander if unsuccessful on the Commanding Officers' Qualifying Course.

(*d*) On passing out of the promotion zone for Commander or Captain, or on promotion to Captain (promotion zone is defined for this purpose as the limits of the seniority period e.g. '3 to 9½ years', not the batch promotion dates) (*see h* below).

(2) GENERAL LIST ENGINEER OFFICERS

(*a*) If specifically not recommended by the Flag Officer Submarines for employment as Senior Engineer Officer of a submarine.

(*b*) On passing out of the promotion zone for Commander or Captain, or on promotion to Captain (promotion zone is defined for this purpose as the limits of the seniority period e.g. '3 to 9½ years', not the batch promotion dates).

(3) GENERAL LIST SUPPLY OFFICERS. On attaining 2 years seniority as a Lieutenant-Commander.

(4) SPECIAL DUTIES LIST OFFICERS. On attaining the age of 50.

(5) OTHER OFFICERS. Officers other than those listed above will normally cease to qualify for continuous payment of SSSM on being appointed away from a submarine. MoD(Navy) may, however, authorize payment of continuous SSSM to such officers in exceptional circumstances. MDG(N) may place the annotation 'SM' against the appointments of certain Medical Officers and Medical Services Officers who are identified as career submariners by virtue of their selection and training for submarines and who fill part-complement billets in submarines and appointments associated with them. Continuous payment ceases on promotion to Surgeon Commander, or appointment as Consultant if this is earlier. All other cases are to be referred to MoD(NPP).

Notes: 1. Medical Officers who have ceased to qualify but who join the Nuclear Submarine Pool may receive SSSM under the terms laid down by MoD(NPP).

2. *See* 2311*a*(1) *Note*.

(6) RATINGS

(*a*) On promotion to officer on the Supplementary List (These men transfer to General Service and must requalify SM as officers before they again become eligible for coninuous payment of SSSM.)

(*b*) Upper Yardmen, on promotion from rating, will retain SSSM in issue as a rating on a 'personal mark time' basis. This will be incorporated in their specially determined rate of basic pay in accordance with 0906*c*(3). SSSM will recommence on re-qualifying SM as an officer in accordance with 2304*b*. Upper Yardmen candidates will, however, cease to qualify for the 'personal mark time' rate of SSSM immediately, if it becomes known that they will not be returning to submarines.

(*c*) Special Duties List candidates will cease to qualify for continuous payment of SSSM as soon as it is known that they will not return to submarines. Otherwise these candidates continue to receive the rate of SSSM they were last drawing as ratings until they re-qualify SM as officers or revert to General Service. SD List officers will receive SSSM as an officer from the date of qualifying in accordance with 2304*b*. ME (SM) candidates who do not return to HMS *Dolphin* will be considered as re-qualified SM as officers upon successful completion of the Nuclear Preparatory Course.

(*d*) On appointment (or re-engagement) to a T100/NCS or ES enagagement. These constitute a reversion to General Service.

g. Any officer who, on reaching one of the career points listed above, is employed as part complement or spare crew of a submarine will retain his SSSM until the effective date of his next appointment.

h. As exceptions to *f*(1)(*d*) above SSSM will be paid continuously to:

(1) Captains qualified SM who are appointed in command of a Submarine Squadron.

(2) Captain Submarine Sea Training.

j. Other officers, of the rank of Captain and below, and men who have ceased to be eligible for continuous payment of SSSM under the rules in *e* and *f* above, will receive SSSM only when actually embarked in a submarine for duty or training. It will be paid at the daily rate appropriate to their rank or rating for each day so embarked. Personnel embarked for passage only are not entitled.

k. Officers, of the rank of Captain and below, and men who are not qualified SM may also be paid SSSM at the appropriate daily rate in the circumstances in *j* above.

l. *See* 2311 for Desk Instructions.

m. *NPSR Supplement:* Nuclear Propulsion Senior Ratings qualified as Category A2 or B Watchkeeper (as defined in BR 3018), who are included in the A2 or B Nuclear Propulsion drafting categories (NPDC at HMS *Centurion*) and who are in receipt of SSSM, are eligible for the supplement.

(1) Payment commences on successful completion of Category B Watchkeeping qualification at sea (which follows the Nuclear Propulsion Operators Course at HMS *Sultan*). Category B qualification will normally be followed by a complemented Category B billet in a running submarine.

(2) Payment/cessation of the supplement will be in accordance with:

(*a*) on giving 18 months notice; or

(*b*) in accordance with SGMs 1605 and 1846; and

(*c*) re-entrants to the Service employed on NPSR duties will become eligible on re-qualification as Category A2 or B Watchkeeper At Sea. Payment may be backdated to date of re-qualifying for SSSM (which will normally be re-qualification in SETT HMS *Dolphin*).

(*d*) On signing a 3 year waiver of discharge in accordance with QRRN article 0836.

(3) Cases which cannot be decided by reference to these rules are to be submitted to FOSM.

Notes: 1. On completion of Category B complemented sea draft will retain NPSR Supplement during shore draft/SSK drafts as long as liability for further service as a nuclear watchkeeper is retained and notice is not given.

2. Ratings who pass NPOC may be required to complete 7 years' service in submarines in accordance with BR 31, QRRN, 0819.1.

3. If an NPSR in receipt of NPSR Supplement is restreamed a own request, a certificate is to be raised and forwarded to Commmodore HMS *Centurion* (or Submarine Drafting Section) as follows when the draft order to SSK/Training/Duties is received:

I, (Name, Rate, Service Number) am a volunteer for restreaming to SSK duties on a permanent basis. I no longer wish to retain my nuclear propulsion adqual or liability for further service as a CAT A2/CAT B* Watchkeeper. I recognize that this will entail loss of NPSR Supplement from the date of my draft order to SSK/Training/Duties*.

EXTRACT FROM AFPR REPORT 1991

Additional pay and allowances

57. Additional pay is an augmentation to the military salary which is paid to certain personnel for whom there is evidence of particular difficulty in recruitment or retention. This might be because the armed forces are in competition with other employers for scarce skills, or because personnel are asked to take on particularly demanding duties. The purpose of additional pay is to alleviate the manning problems which would otherwise result. Each year we review a number of these payments.

Submarine pay

58. Submarine pay is paid to officers of Captain rank and below, and to ratings, in the submarine service, as an inducement to recruitment and retention. The submarine service consists not only of personnel serving in the submarines themselves, but also headquarters staff and the submarine squadron staffs. Career submariners are required to fill appointments of all types and will alternate between sea and shore appointments. There are currently four tiers of submarine pay, depending on rank. In our review of submarine pay last year, MoD advised us that it was achieving its aim of attracting volunteers, but that there were beginning to be some worrying signs of increased outflow. This year MoD has told us of a serious deterioration in the manning position at all levels, ranks and rates, within the submarine service. Taking account of reductions arising from "Options for Change", MoD has suggested some major changes in the structure and payment of submarine pay, which it hopes will stem the outflow of trained personnel. We discuss these changes below.

59. **A general increase above that for military salary.** MoD has suggested to us that there should be a 5 per cent increase in submarine pay, over and above any general uprating in line with the military salary increase, for all members of the submarine service to improve recruitment and retention. This has been put to us on the basis that it is the minimum amount which would be likely to make an impression on the retention problems described. We accept this proposal and recommend accordingly. The revised rates are at paragraph 63 below.

60. **An additional selective increase for some officers.** MoD also suggested that in addition to the 5 per cent increase, there should be a selective increase aimed particularly at the need to retain the more responsible and experienced officers in the submarine service, by targeting the areas of greatest responsibility where at the same time there is the greatest shortage. It was proposed that this selective increase should apply in the form of a fifth tier, above the current four tier structure, applicable only to certain ranks

and branches to give the structure outlined in paragraph 63 below. MoD believes that this would demonstrate to the personnel concerned the value of their services and lead to a reduction in current premature voluntary release levels. We accept this and recommend accordingly.

61. **The introduction of reserve bands of submarine pay.** MoD has proposed that if the more generous payments for key personnel are implemented it would be appropriate to link the continuity rules for submarine pay more closely with sea service. MoD has suggested to us therefore that payment of submarine pay in all five tiers should continue to personnel for three years after they leave a submarine as this would protect earnings during the normal rotation of sea and shore appointments. After 3 years ashore, payment would continue where there is a continuing liabiliy for submarine service, but at lower rates. There would be only two such rates, which it is proposed to call "reserve bands", one for officers previously in receipt of the fourth and the new fifth tier of submarine pay, and one for ratings and others on the first three tiers. A small number of designated shore appointments would continue to attract submarine pay in their own right.

62. We welcome the proposal for reserve bands. We also accept MoD's proposals regarding transitional arrangements for reserve banding of ex-submariners who are already past the three-years-ashore date, but currently on the full rate of submarine pay. This means that some key submarine officers who have been ashore for more than 3 years would be permitted to mark time on a special rate instead of moving immediately to the 1 April 1991 officers' reserve band. Meanwhile the more junior officers and senior ratings, who have been ashore for more than 3 years on 1 April 1991, would mark time on their 31 March 1991 rates until the new reserve band rates catch up. We will review the precise arrangements for reserve banding in particular the number of separate bands and the levels of the reserve rates in relation to the full rates, when there is experience of their operation. In the meantime we shall be looking to see in what other areas of additional pay reserve banding can be applied.

63. **Recommended rates.** Our recommendations for submarine pay are at Table 4.

Table 4 **Submarine pay**

Rank/rating eligible	Normal rate £ a day	"reserve rate"[a] £ a day
Midshipman. Able Rate and below	7·35	7·05
Leading Rate and Petty Officer	8·05	7·05
Acting Sub-Lieutenant, Sub-Lieutenant (except SD List), Chief Petty Officer and Warrant Officer	9·60	7·05[b]
Sub-Lieutenant(SD). Lieutenant (all lists until break points for 5th tier below)	10·30	9·35
Seaman Lieutenant on qualifying Advanced Warfare course. Marine Engineer Lieutenant on recommendation for Deputy Marine Engineer Officer. Weapons Engineer Lieutenant on recommendation for Charge appointment. Lieutenant Commander (all lists). Commander and qualifying captains.	11·85	9.35[c]

[a]Ashore 3 years or more.
[b]Personnel who have already been ashore 3 or more years on 1 April 1991 will mark time on a rate of £8·18 a day.
[c]Personnel who have already been ashore 3 or more years on I April 1991 will mark time on a rate of £10·10 a day.

64. **Career break points.** MoD has also asked us to endorse proposals in respect of career break points for officer submariners, which are designed to rationalise the points at which submarine pay for officers ceases. These are points after which officers no longer have a liability for submarine service, and reflect the different employment patterns of officers with different commissions. One of the main changes is that officers on short commissions (Supplementary List) who previously lost submarine pay on leaving their submarine, will now be on the same terms as other officers. We recommend the introduction of new career break points as proposed by MoD.

2. Memorandum submitted by the Ministry of Defence (15.4.91)

Personnel

A. (e) What is the gravity of the shortfall of Medical Assistants? How is the requirement for 114 arrived at, and how many are on submarines? Have any radiation monitoring duties been transferred to engineering staff to ease the burden on MAs?

A. (e) The requirement for 114 Medical Assistants (Submarines)(MA(SM)) is the sum of the Schemes of Complement of the submarines and shore establishments. Not all of the 114 posts can be filled by other specialisms. There are 94 MAs(SM) available for drafting into MA(SM) billets, a shortfall of 20. Of those 94, 16 are not yet qualified as submariners. 68 of the 94 are at sea in submarines, including 38 out of 43 junior ratings. Radiation monitoring billets for 15 junior rating MA(SM) posts ashore are being temporarily filled by men from other branches who have received training for radiation monitoring duties, but they cannot carry out the medical duties of the MA(SM). Because almost all qualified MAs(SM) are currently serving at sea it is difficult to find reliefs for them 50 that individuals can be provided with a balance of sea and shore service.

A. (f) Why is there a bearing shown of 18 Ops(UW) and nil requirement?

A. (f) The Ops (UW)(SM) branch requirement was subsumed by the WEM(O) sub-branch in the early 1980s and the requirement shown for WEM(O) is the sum of the joint Ops (UW) and WEM(O) requirement. At the time of this amalgamation, UW ratings were given the opportunity to transfer to the WEM(O) branch or to exercise their right under preserved conditions of service and employment regulations and remain in their source branch. The UW trained strength has reduced by 31 over the last 6 years with the current bearing of 18 employed against WEM(O) trained strength underbearings.

A. (g) What steps have been taken in recent years to monitor the general physical health of submariners? What programmes are in place to develop facilities for maintaining physical fitness in submarines?

A. (g) **Physical Health**

All personnel drafted into the submarine service must fulfil the dual requirements of fitness for service in submarines and for Submarine Escape Tank Training (SETT). They must pass the following stages:

(a) Preliminary Medical Examination. Any medical condition which could be exacerbated by service in submarines is identified during the routine preliminary medical examination and is reported to the Submarine Flotilla Medical Officer (SFMO) so that any necessary follow up treatment or referral may be carried out.

(b) Final Examination. Medical documents are sent to HMS DOLPHIN prior to joining for further scrutiny and a final medical is carried out before SETT is undertaken.

(c) SETT Requalification. SETT is carried out at DOLPHIN. The tank is a column of water some 120 feet high and 30 feet in diameter. It is fitted with a number of escape chambers at various depths so that both free ascent and chamber escape methods can be practised. All submariners must complete a SETT course and requalify every three years. They are medically re- examined before each SETT course.

These medicals are rigorous and wide-ranging.

Radiation Protection

All submariners who are classified as radiation workers are given an annual radiation medical and their work and exposure to radiation is carefully monitored at the Institute of Naval Medicine. This is a statutory requirement. Lifetime records are kept for up to 50 years after the last entry of exposure.

The Ministry of Defence has accepted the International Commission on Radiological Protection regulations which allow a radiation worker to receive up to 50 milliSieverts (mSv) of radiation in any one year, with an cumulative dose over any 5 years of 100mSv.

In 1989 MoD made a unilateral decision to reduce the dose accruing to any radiation worker to 30mSv in any one year. Because of naval drafting and career patterns it is unlikely that any naval radiation worker will remain in a radiation environment in which such doses could be accrued for more than two and a half years.

There is a formal investigation if a radiation worker accrues 15mSv in 1 year. The average dose across 1900 workers in 1990 was 2.04mSv and there were six cases when radiation workers received above 15mSv but none received more than 20. On release from the Service classified radiation workers are given a record of their lifetime dose.

Radiation Monitoring

A recent initiative to relieve the pressure on medical staff undertaking monitoring duties resulted in 15 non-medical volunteers taking the Health Physics Monitoring (HPM) course at the Institute of Naval Medicine. All passed the course and this has alleviated the problems of monitoring in Base Environmental Departments in the short term (see Answer A.e.).

Physical Fitness

Space is at a premium aboard submarines and there are no plans to develop facilities aboard which are specific to maintaining physical fitness. Shore facilities are well used between deployments and regarded as satisfactory. The physical condition of submariners is regularly monitored.

A. (h) *The Committee would be assisted by any available figures on exposures updating those published with the Twelfth Report of last session, and in particular Tables 7-11 and 14-27, showing 1990 figures and any significant revisions to lifetime dose tables.*

A. (h) See attached Annex.

Pay

B. (b) *How many ratings and officers in receipt of submarine pay will not have been to sea for three years as of 1 April 1991? What sort of annual savings do you envisage as a result of the new reserve rates?*

B. (b) As at 1 April a total of 944 personnel, 281 Officers and 663 Ratings will not have been to sea for 3 years. Savings from the new reserve rate should amount to £160,000 in 1991/92 and about 500,000 per year thereafter.

Basing, support, refits

D.H. (e) *The Committee would be assisted by details of the £30 million capital expenditure for training facilities and the £10 million for other than training facilities at DOLPHIN for UPHOLDER, as referred to in D.a. The Committee would also be assisted by details of specialised waterfront facilities and workshops at a) DOLPHIN, b) Devonport and c) Faslane; showing in particular those peculiar to an individual class.*

D,H. (e) Of the £30 million capital costs for UPHOLDER training, those that can be separately identified break down as follows:

Ship Control Trainer	£2.484M
Machinery Control Trainer	£1.464M
Auto Pilot	£0.400M
Outer Loop Monitoring System	£0.050M
Depth Data Trainer	£0.053M
Propulsion Switch Board Trainer	£0.180M
Weapon Handling/Discharge Trainer	£5.000M
Command Team Trainer Integration	£1.200M
Sonar Maintainer Trainer	£4.600M
Sonar Command Team Trainer	£1.750M
DCC Trainer Maintainer	£2.200M
DCC Command Team Trainer	£1.500M
Communications Trainers	£0.696M
Works costs for training equipment	£2.983M
TOTAL	£24.56M

Capital expenditure on other than training facilities (which comes to slightly more than 10 million) breaks down as follows:

Berthing and shore support at No 2 jetty and an extension of No 1 jetty	2.037M
Modification of No 1 jetty to provide berthing, mast and periscope workshop, modification of hull engineering workshop, conversion of shop for aluminium and light plate	4.356M
Dredging to provide clear draught for UPHOLDER class	0.5M
Provision of improved accommodation	5.88M*
TOTAL	12.773M

* This accommodation is not exclusively for UPHOLDER class submarine crews.

Details of specialised waterfront facilities are as follows:

a. HMS DOLPHIN (UPHOLDER and OBERON only)

Main jetty

1. Provision for berthing 3 submarines at each of 3 mooring points (trots)(ie 9 submarines in all). At each of the 3 trots there are:
   a. chilled water supplies up to a maximum of 300 kW
   b. diesel fuel oil (dieso)
   c. lubricating oil
   d. fresh water

e. demineralised water
f. disposal of used engine oil (sullage)
g. sewage
h. high pressure air
i. telephones
j. electricity including battery charging supplies
k. Two deep draught pontoon at each of the three trots

2. A tracked crane
3. Deep draught fenders are available for 2 berths

Number 2 jetty (petrol pier) (OBERON class only)

1. Provision for berthing for one in service submarine on the outboard trot and one training submarine on the in board trot
2. The following facilities are available at both trots:
   a. dieso
   b. lubricating oil
   c. fresh water — one common outlet
   d. high pressure air
   e. electricity
   f. telephones
3. A fixed crane

b) DEVONPORT NAVAL BASE (SSNs only)

1. Nuclear repair barge
2. Nuclear repair workhop
3. Nuclear instrumentation
4. Towed array workshop
5. Periscope workshop
6. Mast workshop
7. Electrical Maintenance Room for S & T class
8. Primary Equipment Component repair facility
9. Ordnance workshops
10. Weapon handling facility
11. Quality assurance section
12. Technical information centre
13. Nuclear procedure authorisation group
14. Air purification section
15. Escape workshop
16. Heavy electrical workshop
17. Special tools and lifting gear store
18. Shipwright workshop
19. Cryogenic facility
20. Emergency monitoring headquarters
21. Radiological protection
22. Instrument calibration
23. Radioactive waste disposal
24. Exclusion area
25. Health physics
26. Laboratory

c) FASLANE (all classes)

a. electrical supply
b. high pressure air
c. low pressure air

d. nitrogen
e. demineralised water
f. potable water
g. Firemain
h. dieso from shore
i. oils
j. sewage
k. RN Shiplift
l. Naval Technical Department provides engineering support to current classes of nuclear and conventional submarines, including Polaris boats. Additionally, it will provide support for VANGUARD class submarines.

D,H. (f) Answer D.b. shows that Rosyth, Devonport, Portsmouth or "suitably qualified private yards" could carry out long refit of Upholder submarines. Answer D.a. shows FMRO Portsmouth having (DED facilities for SSKs but not refit, and Defiance and Rosyth having refit facilities for SSKs. Is it proposed to provide Upholder refit facilities at Portsmouth? Which private yards are suitably qualified for Upholder refits, DED and capability update work?

D,H. (f) We do not plan to provide UPHOLDER refit facilities at Portsmouth. On current plans we do not propose to carry out any more refits on the in-service OBERON class boats. Prior to inviting tenders for UPHOLDER class refits, we would carry out an assessment of companies to satisfy ourselves that they had the necessary facilities and resources to carry out the work. The invitation to tender would also appear in the Contracts Bulletin so that any companies which considered themselves qualified could seek to be invited to tender. In principle, the same procedure could be applied to DEDs if it were decided to undertake DEDs outside the submarine's base port. All capability upgrade work is carried out during refit or DED.

The last competition held for similar work was for the refit of HMS ONSLAUGHT. The following companies received invitations to tender:

Babcock Thorn Ltd
Devonport Management Ltd
Humber Shiprepairers Ltd
Swan Hunter Shipbuilders Ltd
VSEL
Yarrow Shipbuilders Ltd

In the event, it was decided to decommission the boat; the refit did not, therefore, go ahead.

D,H. (g) Answer H states that some yards "may have the capability to refit submarines and could in principle be invited to tender for refits and dockings in the future". Have any private yards made approaches to HMG or its agencies to seek to be qualified for SSN or SSBN refit or DED? Does HMG plan to seek tenders for future SSN or SSBN refit or DED from other than Rosyth or Devonport? Has it done so in the past, and, if so, with what result?

D, H. (g) VSEL are showing some interest in undertaking SSN or SSBN refit or DED work. Although licensed under the Nuclear Installations Act to undertake nuclear powered submarine building, VSEL would have to seek a licence to undertake nuclear refitting activities from the Nuclear Installation Inspectorate.

In the past, whilst under public sector management, Chatham Royal Dockyard undertook nuclear submarine refit and DED work but no tenders or contracts were involved. No private yards have undertaken SSN refits or DEDs in the past. Future requirements for refit capacity are under review following Options for Change.

D,H. (h) What are the latest timings for the process of preparation for lay-up of a) Warspite, b) Conqueror, and c) Churchill; and when will each be defuelled?

D,H. (h)

a. WARSPITE — all fuel will be removed from the vessel by the end of * * * ; the boat will undock in * * * and completion is expected in * * * .
b. CONQUEROR — defuelling is currently planned for * * * subject to the availability of DML skilled personnel. The aim is to de-equip, defuel and prepare CONQUEROR for lay-up in the most efficient and economical manner having regard to the rest of DML's workload and the resources necessary
c. CHURCHILL — defuelling has been completed. Undocking is planned in April 1991 with completion in * * * .

D,H. *(i)Can you give further details of how submarines operating far from their home base—for example, in the Falkland Islands, or Opossum on its recent publicised worldwide deployment to Pitcairn Island &c—are in practice supported, as referred to in Answer D.c. ? Can self-maintenance periods be undertaken away from the UK?*

D,H. (i) Support for conventional submarines deployed away from the UK is achieved by making use of local facilities and by transporting spares, test equipment and engineering personnel to the location if necessary. During the HMS OPOSSUM's recent deployment an Assisted Maintenance Period of 4 weeks was conducted in Australia. A self-maintenance period was conducted during OPPOSUM's visit to Singapore. No significant maintenance was conducted or required during her visits to Pitcairn or Tahiti.

Away from the UK, nuclear-powered submarine maintenance can only be conducted in the Falkland Islands, in the USA and at US Navy Submarine Support Tenders. Facilities in the Falklands are provided by the Forward Repair Ship (FRS) RFA DILIGENCE, which has the capability to conduct essential nuclear maintenance and instrument calibration. The FRS can also support SSKs deployed to the Falklands.

Weapons

G. *(d) Are all Tigerfish in service upgraded to Mod2 standard? Are any further modifications planned prior to the introduction of Spearfish? Will Tigerfish continue to be deployed on Oberon and Resolution class submarines? How will Tigerfish stocks be disposed of?*

G. (d) All Tigerfish torpedoes have been upgraded to Mod2 standard and no further modifications are planned. All submarines will continue to deploy Tigerfish until sufficient stocks of Spearfish become available. Tigerfish will not be replaced by Spearfish on OBERON and some RESOLUTION class platforms. When Tigerfish stocks become surplus to requirements, the weapons may be offered for sale through the Defence Export Services Organisation or scrapped.

G. *(e) What is the current state of the Spearfish programme, as regards production, manufacturing, trials and ISD? Are the agreed characteristics being met in trials? What is the size of the first planned order? What modifications are required to existing submarine fire control and other systems?*

G. (e) Development of the Spearfish torpedo is nearing completion. 100 weapons have been manufactured under a combined development and initial production prime contract with Marconi Underwater Systems Ltd (MUSL).

Over 60 in-water trials have been conducted to date. These have demonstrated that the weapon has a good overall performance and meets the Agreed Characteristics called for in the contract. However, the design has not yet been accepted as the required level of reliability has yet to be demonstrated. In December 1990, agreement was reached with MUSL on a * * * Reliability Assurance Programme (RAP), to be undertaken within the agreed fixed price, aimed at raising Spearfish reliability to the required level. The RAP will include a further 40 test firings.

Subject to the RAP proving successful, and also within the fixed price, the initial 100 weapons will be brought up to the agreed standard at the end of the * * * period. These weapons are expected to enter service in * * *

A main production order would follow if the RAP was successful.

The introduction of Spearfish will necessitate extensive modifications to the existing submarine command, fire control and weapons handling and discharge systems to match the enhanced targeting capability, higher mass and more stringent magazine safety requirements of the new weapon. VANGUARD class submarines will incorporate the required features during build; other submarines will be modified during planned refit and maintenance periods.

G. *(f) The Committee has noted reports of the cancellation of a contract with Dowty Fuel Systems for the development of a closed-cycle steam turbine propulsion unit, with application for heavyweight as well as lightweight torpedoes. How far had development gone, and at what cost to MoD? Why was it cancelled?*

G. (f) The research programme to develop a Closed-Cycle Turbine System (CCTS) for torpedo propulsion began in 1985. The aim was to explore the scope for potential improvements in in-service and future torpedoes and the risks involved. It had made substantial progress in some areas, notably the turbine, gearbox, alternator and other engine components. Testing had been carried out on these elements individually and the contractor was on course to produce a complete engine which could be coupled to a boiler to prove the technology concept. However, development of the boiler—which was being carried out by the Admiralty Research Establishment (ARE)—remained a high risk area, as did the pyrotechnic device intended to initiate the chemical reaction cycle. Problems with the latter had led to the failure of two consecutive boiler tests, one of which resulted in a contained explosion at the contractor's test site. Investigation of these problems and the further development work needed to solve them would have added considerably to the cost and duration of the CCTS programme.

MoD contractual commitment at the time of cancellation was about £16 million (including VAT at 15%). In addition, intramural costs of approximately £500,000 had been incurred by ARE. The programme was cancelled because of technical difficulties and because * * *

G. (g) *Are there arrangements for the use of US Captor (encapsulated torpedo) anti-submarine mines? Are there any plans to develop a UK equivalent, or to procure captor mines?*

G. (g) There are no National arrangements for the use of US Captor anti-submarine mines. The UK has no plans for developing an equivalent or procuring direct from the USA.

G. (h) i) *Has 2020 bow-mounted sonar been fitted to all S and T class SSNs? Has the 2032 electronics processing package been fitted?*

G. (h) i) Sonar 2020 has been fitted to all T class SSNs on build and to three S class SSNs at first refit.

* * *

Sonar 2032 has been fitted to all SSNs and SSBNs.

G. (h) ii) *What is the current status of the 2074 and 2076 sonar programmes' reported to be designed to be updating S and T class submarines, replacing 2020?*

G. (h) ii) Sonar 2074 is in production. The Sonar 2076 suite is about to enter the Project Definition phase. Sonar 2074 is part of the Sonar 2076 suite.

G. (h) iii) *The Vanguard class Trident submarines will have the advanced Type 2054 sonar. Will the improvement this represents be available to S and T class SSNs?*

G. (h) iii) The integrated Sonar Suite 2054 was designed specifically for the VANGUARD class SSBN, and is therefore too large to fit in SSNs. However, Sonar 2076 draws heavily on the technology and system architecture developed for Sonar 2054.

G. (h) iv) *Is there a shortage against requirement of clip-on submarine towed arrays?*

G. (h) iv) * * *

G. (i) i) *Further to Answers G.(b). and (c). on Oberon and Upholder: i) What plans does MoD have for the disposal of the three unfitted sonar 2051 and outfit DCH sets? ii) Is it planned to fit all S and T boats with NATO SINS?*

G. (i) i) Some of the unfitted equipment is already being used to provide spares support for equipments which remain in service. If all the equipment were to be used in this way, the need for new buys of spares to a total value of over £5 million could be avoided. However, the possibility of offering some of the equipment for overseas sale, either separately or as part of a complete submarine package, has not been discounted.

G. (i) ii) Yes.

G. (j) *The Committee would be assisted by a classified note on plans to upgrade submarine communications systems.*

G. (j) In order to ensure that they remain covert, submarines seldom transmit signals, but they need to be able to receive telecommunications messages from their controlling shore authority.

* * *

RESEARCH

K. (b) *The Committee has noted the degree of funding of research and development of AIP and other non-nuclear propulsion carried out in other countries, and wishes to have details of any studies or research carried out or funding by (a) MoD and (b) other Government departments, showing the amounts of manpower and resources devoted to it. It would also be assisted by an indication of any NATO, IEPG or other multinational input.*

K. (b) The major areas of research into AIP are:

(i) Lithium Aluminium/Iron Sulphide (LAIS) batteries. The main thrust of MoD-sponsored AIP research over the last few years has been in the development of High Energy Density submarine batteries based on a Lithium Aluminium/Iron Sulphide technology. These batteries have the potential to increase the endurance of SSKs significantly. ARE Holton Heath have a world lead in this technology and considerable interest has been shown by industry. In recent years VSEL have provided some of the funding for the programme. ARE Holton Heath are now negotiating a jointly funded development programme between ARE, VSEL and Oakdale Batteries Ltd. In recent years, the approximate annual ARE spend has been about 500,000.

(ii) Fuel Cells. There is considerable international interest, both commercial and military, in the development of fuel cell technology. Thus there is no current MoD- sponsored dedicated research into basic fuel cell technology. There appears to be sufficient commercial interest and investment to meet any perceived future requirement. However, there may be a future need to investigate areas specific to a submarine application, such as fuel management systems and safety aspects, and this is currently under consideration. A fuel cell test facility still exists at ARE, based on commercial equipment, and the future for this facility is under review as part of the Defence Research Agency (DRA) restructuring. The German Navy have trial fuel cells fitted in a submarine, although it is understood that this system has not lived up to its expectations.

(iii) AIP engines. There are a number of potential systems for AIP engines. However, these systems have drawbacks and are not likely to offer the cost-effective improvement in performance sought. There is no dedicated UK research programme into AIP engines. RNEC Manadon have an AIP Engine test facility which is used for system evaluation and student training.

A MoD/VSEL study into potential options or submarine AIP systems has recently been completed. These included complete AIP systems as well as hybrid options to increase the endurance of SSKs. Further UPHOLDER-related studies will shortly be commissioned. To date the total spent has been approximately 60,000, with a further forecast spend of £60,000.

There are currently no UK IEPG agreements in this area. Future collaboration may be possible, depending on the outcome of our national studies.

SSN20

L. The Committee would be assisted by a memorandum on the progress of the SSN20 programme to date from its inception, showing past, current and future expenditure, and indicating those principal areas in which SSN20 would be an improvement over the SSN19.

L. Following concept studies which began in 1982, Feasibility Studies into the requirement for a future SSN were carried out between 1986-89. Before the programme advanced to Project Definition, the requirement for SSNs was considered as part of the work on Options for Change. The Secretary of State announced on 25 July that the UK would maintain a force level of about sixteen submarines, three-quarters of which would be nuclear- powered. No decisions have yet been taken on the nature or timing of orders necessary to maintain that force level.

In carrying out the Feasibility Studies on SSN20, the Ministry was aiming for improvements in propulsion, noise signature and the main sensor and command systems compared with the capability offered by current SSNs. The work completed is applicable to possible capability enhancements in current and future SSN classes.

Expenditure to date on the programme amounts to some £42 million (at constant 1990/91 prices), against a total committed spend of almost £46 million. This covers both platform and weapons system elements. Expenditure is currently limited to the settlement of outstanding bills for feasibility study work and the decommissioning of trials equipment.

The figures below are provisional: see page 55

TABLE 7: Annual Individual Radiation Dose Equivalents Naval Nuclear Propulsion Programme—All Personnel—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
5703	38	32	1	0	0	5775	9.96	1.72

TABLE 8: Annual Individual Radiation Dose Equivalents Devonport Dockyard Personnel—1990

*0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
1716	0	0	0	0	0	1716	1.56	0.91

*Includes Written System Personnel

TABLE 9: Cumulative Lifetime Radiation Dose Equivalents—Devonport Dockyard

Based on numbers registered as employed at 22 March 1991

Lifetime Dose Range (mSv)	Percentage of Monitored Workforce
0–50	76.67
50–100	13.13
100–200	7.39
200–300	2.11
300–400	0.70
400–500	0.00
Greater than 500	0.00
Total	100.00

TABLE 10: Annual Individual Radiation Dose Equivalents—Rosyth Dockyard Civilian Workers—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
*1,455	5	0	0	0	0	1460	2.24	1.53

*Includes Written System Personnel
Data Supplied by BTL Rosyth.

TABLE 11: Cumulative Lifetime Radiation Dose Equivalents for Rosyth Dockyard Personnel

Based on numbers registered as employed at 22 March 1991

Lifetime Dose Range (mSv)	Percentage of Monitored Workforce
0–50	53.21
50–100	18.20
100–200	16.36
200–300	7.49
300–400	3.06
400–500	1.38
Greater than 500	0.31
Total	100.01

TABLE 14: Annual Individual Radiation Dose Equivalents for all Personnel at Vulcan NRTE—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
403	1	0	0	0	0	404	0.969	2.40

TABLE 15: Cumulative Lifetime Radiation Dose Equivalents Vulcan NRTE

Based on numbers registered as employed at 22 March 1991

Dose Range (mSv)	Percentage of Monitored Workforce
0–50	67.9
50–100	18.3
100–200	8.7
200–300	3.6
300–400	1.1
400–500	0.4
Greater than 500	0.0
Total	100.0

TABLE 16: Annual Individual Radiation Dose Equivalents for all Personnel at HMS Defiance—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
303	7	0	0	0	0	310	0.897	2.89

TABLE 17: Cumulative Lifetime Radiation Dose Equivalents HMS Defiance

Based on numbers registered as employed at 22 March 1991

Dose Range (mSv)	Percentage of Monitored Workforce
0–50	95.2
50–100	4.5
100–200	0.3
200–300	0.0
300–400	0.0
400–500	0.0
Greater than 500	0.0
Total	100.0

TABLE 18: Annual Individual Radiation Dose Equivalents for all Personnel at Clyde S/M Base—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
337	21	28	1	0	0	387	2.093	5.41

TABLE 19: Cumulative Lifetime Radiation Dose Equivalents Clyde Submarine Base

Based on numbers registered as employed at 22 March 1991

Dose Range (mSv)	Percentage of Monitored Workforce
0–50	90.8
50–100	5.6
100–200	3.1
200–300	0.5
300–400	0.0
400–500	0.0
Greater than 500	0.0
Total	100.0

TABLE 20: Cumulative Lifetime Radiation Dose Equivalents for the Naval Nuclear Propulsion Programme including Submarines

Based on number registered as employed at 22 March 1991

Dose Range (mSv)	Percentage of Monitored Workforce
0–50	83.50
50–100	9.00
100–200	4.80
200–300	1.80
300–400	0.66
400–500	0.23
500–600	0.04
Total	100.03

Note: This table includes the personnel from Devonport, Rosyth, Chatham, Vulcan, Defiance, Clyde Submarine Base and Operational Submarine Personnel.

TABLE 21: Annual Individual Radiation Dose Equivalents for all Personnel Monitored on the DRPS System—1990

0–15 mSv	15–20 mSv	20–30 mSv	30–40 mSv	40–50 mSv	> 50 mSv	No. of Monitored Employees	Collective Dose (ManSv)	Average Dose (mSv)
9305	39	43	1	0	0	9378	10.943	1.17

TABLE 22: Cumulative Lifetime Radiation Dose Equivalents for MoD Personnel (excluding AWE)

Based on number registered as employed 3 April 1991

Lifetime Dose Range (mSv)	Percentage of Personnel Receiving Doses in the Ranges Shown				
	Navy	Army	RAF	Civilian	Total
0–50	95.26	96.06	99.60	76.55	86.60
50–100	3.64	2.25	0.27	11.40	6.88
100–200	1.02	0.56	0.13	7.65	4.17
200–300	0.08	0.38	0.00	2.78	1.49
300–400	0.00	0.38	0.00	1.05	0.57
400–500	0.00	0.38	0.00	0.48	0.24
Greater than 500	0.00	0.00	0.00	0.08	0.04
Total	100.00	100.01	100.00	99.99	99.99

3 Letter from the Private Secretary to the Secretary of State for Defence to the Clerk of the Committee (2.5.91)

The list of questions relating to the Committee's Inquiry into RN submarines forwarded under cover of your letter of 6 March contained a request for an update of the radiation exposure figures published in the Twelfth Report of 31 October 1990 (Question A(h)). In response, a set of tables was sent to you on 15 April.

It has now become clear that the figures given in the tables can only be regarded as provisional. Sixteen dosemeters have yet to be returned to the Defence Radiological Protection Service for measurement and recording. While a statistical tabulation allocating workers to a range of dose bands based on this data is unlikely to be affected when the final results are known, it is possible that some workers could receive higher or lower than the notional doses allocated,* in that event they might have to be moved to a different dose band. Final validation and analysis will not take place until the end of May at the earliest.

I am sorry the position was not made clear to you at the proper time.

*In our tables.

4. Memorandum submitted by the Ministry of Defence (15.5.91)

1. It would be helpful to have an unclassified note on the life cycle costs attributed to (a) a new T class SSN joining the Fleet; (b) an Upholder class SSK, and (c) a Type 23 frigate, raised at Qq 630ff. It would be helpful to indicate whether the first figure includes decommissioning costs.

1. There is at present no standardized accounting system within MOD for collecting historic life-cycle costs or predicting the life-cycle costs of individual ships or submarines. The problems arise in determining which elements of in-service support and operating costs should be attributed to a vessel or class of vessels. An example is the difficulty of determining how fixed dockyard infrastructure costs should be allocated between vessels undergoing refit. The problem is being addressed and work is now under way to develop a standard system for gathering all the relevant life cycle cost elements on a consistent basis. Once in place, the system will allow comprehensive comparisons to be drawn between the life cycle costs of alternative ship or submarine procurement options before procurement decisions are made. At present, however, MOD is able only to provide approximate life cycle cost figures for the vessels referred to in the question, and cannot guarantee that the cost allocation principles used are consistent in detail between different classes of ship. On this basis, the approximate life cycle costs of a new vessel of the various classes would be:

(a) £765M*

(b) £315M

(c) £350M

* Excluding decommissioning costs.

2. It would be helpful to have an unclassified figure for the approximate costs to date attributable to development of PWR2, as opposed to production of PWR2 for Vanguard submarines, as referred to in Q660.

2. The approximate cost to date of developing PWR2 is £500 million.

3. The Committee would be assisted by details of the submarine refits carried out in private yards since 1979 as referred to in Q686, showing the yard, the submarine, and the approximate cost.

3. Excluding contracts awarded to Devonport Management Limited and Babcock Thorn Limited since 6 April 1987, Humber Shiprepairers Limited were awarded the contract to refit HMS OTTER in December 1984. The total cost of the refit was about £16 million.

4. A note on the current review of the future of Service engineering education would be helpful, as offered at 726.

4. As part of work on Options for Change, the whole of the support area is being examined to establish where savings might be found which are commensurate with savings in the front line. Training establishments are included in this examination, with the scope for rationalisation of training and training estate being pursued both within individual Services and on a tri-Service basis. An example of the former is the recently announeed decision to move the RN leadership school from Royal Arthur.

Any further decisions will, of course, be announced at the appropriate time.

5. Memorandum submitted by the Ministry of Defence (15.1.91)

SUBMARINE OPERATIONS IN WATERS FREQUENTED BY FISHING VESSELS

Introduction

1. The Committee has asked for a memorandum on this subject following the loss of the Fishing Vessel ANTARES in the Firth of Clyde on 22 November 1990. This note addresses the following aspects:—

(a) The need for submerged operations by submarines in areas frequented by fishing vessels;

(b) The procedures followed by submariners for avoiding fishing vessels and their gear;

(c) The incidence in recent years of accidents to fishing vessels involving submarines;

(d) Possible remedies—in particular the introduction of electronic net-avoidance devices and the Clyde area submarine movement notification scheme.

The Need for Submerged Operations

2. The submarine is, by its nature, a covert weapon system. Its tasks include anti-submarine and anti-ship operations, covert surveillance and, in the case of Polaris (and in due course Trident), the deployment of the United Kingdom's strategic nuclear deterrent. In all these roles the submarine's ability to operate unobserved is crucial both to the effective performance of its task and to its own survival in war.

3. It follows from this that a potential enemy can be expected to devote considerable effort in peacetime to acquiring knowledge of the capabilities, operating patterns and deployment routes of Royal Navy submarines; and, building on such knowledge, in a period of tension to locating them. So far as possible, therefore, our submarines must operate away from the visual or electronic observation of opposing or potentially opposing forces. This objective is less difficult to achieve in the open seas than in the North Western and South western approaches to the UK, through which most submarines are obliged to travel in order to move to and from the two main operating bases of Faslane and Devonport. Some sea areas are important also to United States Navy (USN) operations centred on Holy Loch. If precise deployment routes are to remain covert, it is necessary for submarines passing through these areas to do so, for a large proportion of the time, submerged.

4. This necessity is not one which is limited to war or tension. It applies also in peacetime, not only (as stated above) in order to prevent a potential enemy acquiring a knowledge of operating patterns and capabilities but also to train submariners in the skills which they would have to practise in war (such as navigation and conducting operations in shallow, confined waters) and in routine peacetime operations such as equipment calibration and noise ranging. Nor is such training a once-for-all activity. The turnover of personnel through the Naval Service, the need to qualify sailors for in-service advancement, the introduction of new equipment, the evolution of new tactics—all these contribute to a continuous training task.

Procedures for the Avoidance of Fishing Vessels

5. Modern submarines are highly sophisticated vessels equipped with a range of underwater sensors. It is reasonable, therefore, to ask why they seem to be incapable sometimes of detecting the presence of fishing gear.

6. A submarine's primary task is to detect other submarines or surface ships without being detected by them. It is equipped with a sonar suite comprising a number of different types of equipment, each one fulfilling a separate function. Royal Navy submarines have the capability to transmit active sonar, which involves sending a pulse of sound into the water and listening for the return echo. But active sonar is designed primarily to detect other submarines at long range in open waters (ie off the UK Continental Shelf). It is not the underwater equivalent of radar but a more imprecise science with many factors affecting its performance. Echoes are received from a multitude of sources such as the bottom, fish, water structure and the surface. An object with a small echoing area, such as a trawl, is easily lost in the numerous returns from these sources.

7. The submarine's main sensor is its passive sonars, which enable it to listen for noise radiated by other vessels. This task is complicated in inshore waters by the greater underwater noise which is present—from the action of waves against the land, from weather disturbance and from biological noise caused by sea animals in these fish-plentiful areas as well as from the concentration of shipping in coastal areas.

8. There are a number of types of trawl used by fishermen—some are dragged along the seabed, others are towed in mid-water (pelagic trawls). Those making contact with the seabed are easily detectable on a submarine's sonar suite from the noise they generate; but a pelagic trawl makes relatively little underwater noise and can usually only be detected at short ranges. The fishing vessel itself, if propelling on its engines, should be detected by the submarine's sonar at reasonable ranges. But the trawl will be evident only if it is radiating sufficient noise. From this point of view the attachment to trawls of a serviceable electronic transmitting device capable of being received by submarines would be a considerable advantage.

Incidence of Submarine/Fishing Vessel Interaction

9. Fishing is a hazardous occupation. Since 1980 nearly 350 fishing vessels on the UK register have been lost at sea, mainly in the waters around the UK. Two of these—SHERALGA (1982) and ANTARES (1990)—foundered as the result of a submarine fouling fishing gear. These figures are not quoted with any intention of dismissing submarine/fishing vessel encounters as being of no importance: the Ministry fully accepts that two fishing vessel losses from submarine action are two too many. They are, however, quoted in order to put the problem into perspective: less than 1% of UK-registered fishing vessels lost at sea since 1980 have foundered as the result of interaction with submarines.

10. Having said that, the Ministry recognises that there are two counter-arguments. The first is that, while only two founderings have taken place as the result of submarine involvement with fishing gear, there have been other such incidents which might have had the same result. Since 1980 there have been 16 incidents (listed below) in which submerged Royal Navy or Allied submarines have fouled fishing gear:[1]—

Date	*Vessel*	*Location*
4 Nov 80	Union	Portland Area
17 Nov 81	Sapphire	Clyde Area
18 Apr 82	Sheralga	Irish Sea
1 Dec 82	Algerie	Plymouth Area
6 Dec 82	Berachan	Irish Sea
10 Mar 83	Targuen	Irish Sea
11 Aug 84	Huntress	Clyde Area
18 Feb 87	Summer Mourne	Irish Sea
26 Sep 87	Heroine	North Channel
6 Dec 87	Prevail	North Channel
3 Dec 88	Mount Eden	Off Malin Head
17 Apr 89	Laurel	Irish Sea
26 Jun 89	Huntress	Clyde Area
12 Sep 89	Contester	Irish Sea
13 Nov 89	Scotia	Off Lewis
22 Nov 90	Antares	Clyde Area

11. A second counter-argument which is often put forward is that the the Ministry is not 'owning up' to the involvement of submarines in numerous other incidents in which fishing vessels either claim to have had their gear fouled by submerged submarines or have foundered in unexplained circumstances. The Ministry does not maintain records of all such allegations. Two points, however, need to be made here. First, if a submarine has reason to believe that it might have 'snagged' fishing gear, it must report the situation immediately. This was, in fact, what happened in the case of the ANTARES: the submarine surfaced and reported the position to naval headquarters at Faslane, who notified both the Coastguard and the Clyde Fishermen's Association. Similarly, if an allegation is made by a fishing vessel that it has become involved with a submarine at sea or if an unexplained fishing boat loss at sea is attributed to submarine involvement, the Royal Navy carefully checks whether any British or Allied submarine was operating in-the area in question at the time. If the answer is positive, further investigation is carried out (eg by contacting the submarine in question, examining the boat on return to port) in order to ascertain whether there could have been fishing vessel/submarine interaction. The Ministry does not, however, seek to deny submarine involvement if it is clear that this has happened.

12. A second point to consider is that many fishing vessel incidents which are alleged to involve submarines have occurred in water either too shallow for submarine operations or in depths of water where a submerged submarine would have little clearance from the sea bed and in which it is RN and USN policy not to operate on safety grounds. The Committee has cited the Straits of Dover, which is one such area and through which British and Allied submarines transit on the surface. But there are many others (eg in the north eastern sector of the Irish Sea) where a number of fishing vessels have been lost but where submerged submarine operations are not a practical proposition.

Technical Remedies

13. The current programme of research was begun in the summer of 1989, when the Admiralty Research Establishment (ARE) was asked by Ministry of Defence Headquarters to propose techniques by which submerged submarines might be better alerted to the presence of fishing trawls and to consider certain specific ideas, such as the use of transponders. The Department of Transport (D Tpt), which has the lead in government on safety at sea, undertook primary responsibility for assessing the feasibility and merit of any proposals put forward; and the Royal Navy agreed to assist in the further development and trialling of those ideas which the D Tpt considered to show merit.

[1]See annex on page 60, for further details of these incidents. (Submitted by the Ministry of Defence on 15.3.91)

14. In the autumn of 1989, therefore, the D Tpt commissioned the ARE's Civil Marine Division to conduct a feasibility appraisal of technical proposals put forward by the Humberside International Fisheries Research Institute and Seametrix Ltd of Aberdeen. By the end of 1989 the conclusion had been reached that the Seametrix proposals showed merit and Seametrix was invited to modify its system to meet a draft specification, prepared by the ARE, for 'pingers' which could be attached to fishing nets and whose signal could be received by a submerged submarine. A prototype static device was produced by Seametrix and subjected to underwater trials by the Navy in July 1990. The results of these trials indicated that submarines would be able to detect signals from 'pingers' at ranges of between 3,000 and 8,000 yards, which is considered by the Navy to represent a satisfactory range for the taking of avoiding action. The Navy did, however, suggest that the trials should be repeated in a different area in order to explore the effects of different propagation conditions.

15. A further series of static trials was therefore planned but it was decided following the loss of the ANTARES that these should be dispensed with and that the programme should proceed to under-way trials, involving a towable version of the prototype. The first series of these was held in mid-December 1990. The intention is that there should be a further round of under-way sea trials in order to provide other manufacturers, many of whom have contacted the MOD since the loss of the ANTARES, with an opportunity to display the effectiveness of their own equipment.

16. The work being done is, therefore, being carried out by three agencies—by the ARE, which is setting the specification on behalf of the D Tpt; by industry, which is developing prototypes (largely at firms' own expense); and by the Royal Navy, which is providing submarine and surface assets for the conduct of trials. Some £10,000 has so far been incurred by the ARE in the work commissioned by the D Tpt; the costs to the RN have not been recorded separately from those of other Fleet activity. The question of funding of 'pingers', if such devices are shown to be effective, has yet to be resolved.

Other Remedies

17. A further initiative that the Ministry has taken in the light of the ANTARES incident, is to introduce, in co-operation with local fishermen's associations, a scheme for the notification to fishermen of the areas and times of planned submerged submarine activity within the inner Clyde area. The information is broadcast by the Clyde Coastguard every four hours on VHF and is also available by telephone from the operations room at Faslane. Local fishermen have also undertaken to inform the Navy in advance of those times in which fishing activity is expected to be heavier than usual. The scheme began on 17 December.

18. This scheme will not give precise details of submarine operations or deployments: it will simply say that submerged submarine activity is planned for a particular day in a designated general area. It will not preclude fishing in such areas: its purpose is to indicate to fishermen the areas where submerged submarines are to be expected and, by exception, where they may fish without concern about the possibility of interaction with submerged submarines.

19. As the scheme only became operational on 17 December, it is too early to be able to judge its effectiveness.

Annex

Date	*Vessels*	*Location*	*Remarks*
4/11/80	FV UNION RN S/M	Portland Area 50 15N 002 24W	Incident with dived submarine damaged trawl. French vessel.
17/11/81	FV SAPPHIRE RN S/M	Clyde Area 55 37N 005 27.5W	Dived submarine fouled nets
18/4/82	FV SHERALGA RN S/M	Irish Sea	Incident with dived submarine. Fishing vessel lost, crew safely recovered from water.
1/12/82	FV ALGERIE RN S/M	Plymouth Area 49 25N 006 20W	Dived submarine snagged nets. Nets cut to avoid collision.
6/12/82	FV BERACHAN US S/M	Irish Sea	Incident with dived submarine.
10/3/83	FV TARGUEN RN S/M	Irish Sea	Dived submarine became entangled in net. French registered fishing vessel.
11/8/84	FV HUNTRESS RN S/M	Clyde Area	Incident with dived submarine.
18/2/87	FV SUMMER MOURNE US S/M	Irish Sea 54 07N 005 10W	Incident with dived submarine.
26/9/87	FV HEROINE US S/M	North Channel 54 43.94N 005 13.2W	Incident with dived submarine. All fishing gear lost.
6/12/87	FV PREVAIL RN S/M	North Channel 55 03.83N 005 35.02W	Submarine entangled in nets. Fishing vessel lost all gear.
3/12/88	FV MOUNT EDEN RN S/M	Off Malin head 55 49.7N 007 46.4W	Incident with dived submarine. Nets parted with no damage to the fishing vessel. Submarine came to periscope depth to communicate with FV. HMS ACHILLES in area also contracted FV.
17/4/89	FV LAUREL US S/M	Irish Sea 54 18.43N 005 01.57W	Fishing vessel nets snagged by dived US Submarine off Isle of Man. Nets cut by crew for safety.
26/3/89	FV HUNTRESS RN S/M	Clyde area 55 35.5 N 005 1.6W	FV towed backwards before submarine surfaced alongside.
12/9/89	FV CONTESTER RN S/M	Irish Sea 53 35 N 005 29 W	Fishing vessel nets caught submarine's towed communications aerial. Aerial separated but left large fibreglass buoy in nets.
13/11/89	FV SCOTIA RN S/M	Off Lewis 58 31.4N 005 59.09W	Fishing vessel towed backwards by dived submarine.
22/11/90	FV ANTARES RN S/M	Clyde Area 55 39.3N 005 03.2W	Fishing vessel sunk with loss of all 4 crew. Submarine reported snagging, surfaced and made search but found no untoward signs. FV later found on bottom and recovered by Navy.

6. Letter from the Private Secretary to the Secretary of State for Defence to the Clerk of the Committee (14.12.90)

Thank you for your letter of 13th December. I can confirm that there has been no break in the deterrent patrol since 28th November or indeed at any stage.

7. RN Board of Inquiry into the loss of the Fishing Vessel ANATARES (6.6.91)

Following the sinking of the Fishing Vessel ANTARES in the Firth of Clyde on 22 November 1990, a Royal Navy Board of Inquiry was convened in accordance with Queen's Regulations to investigate and report on the circumstance surrounding the sinking. This note summarises the main findings of the Inquiry as forwarded to the Ministry of Defence by the Commander-in-Chief Fleet.

2. The Board of Inquiry was concerned principally with the actions of the submarine HMS TRENCHANT at the time of the accident. It took evidence from memlers of the ship's company of HMS TRECHANT, from other members of the Royal Navy with relevant experience or expertise and from the skippers of the fishing vessels HEROINE AND HERCULES. The Board also inspected ANTARES after she had been raised from the sea-bed and had access to records from some of HMS TRENCHANT's sensors and to a tape of dialogue in the submarine's control room during the period in question.

3. The work of the Board of Inquiry is quite separate from the investigation being conducted by the Marine Accident Investigation branch of the Department of Transport. This investigation is continuing and will be accorded all possible assistnace by the Ministry of Defence.

Summary of Events

4. The Board of Inquiry records that on the night of 21/22 November HMS TRENCHANT was conducting the inshore operations phase of the Submarine Commanding Officers' Qualifying Course (which is designed to test the suitability of experienced submarine officers for command appointments). Members of the course and the officer commanding the course were embarked. Just before 0200 on 22 November TRENCHANT completed an exercise carried out in company with the frigate HMS CHARYBDIS in deep water off the NE shore of the Isle of Arran in the Clyde approaches. HMS TRENCHANT then moved away in order to prepare for the next phase of her proramme.

5. At the time three fishing vessels, ANTARES. HEROINE and HERCULES, were trawling in the area. HMS TRENCHANT was operating well below periscope depth and was therefore relying on passive sonar, rather than visual or radar information, to keep track of surface movements. The interpretation of information derived from passive sonar is far from straightforward and the Board of Inquiry has established that HMS TRENCHANT's comprehension of the surface picture was confused. There were a number of reasons for this. In the hour before the incident HMS TRENCHANT had been conducting evasive manoeuvres as part of her exercise with HMS CHARYBDIS. A comprehensive picture of the surface plot was unavailable from her sonar as contacts came into and out of her field of sonar cover, faded from the sonar traces, merged or were confused with new contacts. The situation was further complicated by the fact that ANTARES and HEROINE were for some time on almost the same bearing, alert steering opposite courses, both at slow speed. Shortly after 0200 HMS TRENCHANT altered course towards both Fishing Vessels and began, by virtue of her extra speed, to overhaul them. It was not appreciated on board the submarine that there were two separate contacts close ahead of HMS TRENCHANT and that the closest point of approach of one of them was very near to the submarine's own track. Moreover, owing to the design of ANTARES' fishing gear, the distinct noise normally made by trawls, detectable by a submarine's passive sonar, was absent. As a result the approach of ANTARES and the danger her trawl presented did not become apparent until she was already dangerously close. At that point the submarine, alerted to the presence of ANTARES by the rapid movement of her bearing to the right, turned to her own left in order to keep clear. Soon afterwards, at 0218, exterior hull noises were heard in the submarine; these must have been the sound of ANTARES' trawl becoming entangled with the submarine's casing.

6. It was recognised in the submarine that contact had probably been made with a fishing trawl. There was no indication from the submarine's sensors that anything more serious had occurred. The submarine was returned to periscope depth with considerable care and a visual search was conducted. Two fishing vessels were sighted on a bearing close to where the incident took place. Both vessels appeared to be operating normally and this reinforced the view that no serious incident had taken place. Repeated attempts were made to contact the two fishing vessels on various VHF channels, but there was no response. A report on the incident was made to the submarine base at Faslane, which in turn alerted the Coast Guard. HMS TRENCHANT then surfaced and discovered that a wire rope of the type used for fishing had cut ino one of her sonar domes. HMS TRENCHANT remained on the surface for some two hours and conducted a full visual search. However, in the absence of any indication to the contrary, the conclusion was reached that only the periphery of a trawl had been caught and that this had not been noticed by either of the two trawlers visible in the area. The Board of Inquiry noted that, on the basis of the evidence available at the time, this was a credible view. The submarine therefore resumed its exercise programme.

Conclusions of the Board of Inquiry

7. The Board of Inquiry concluded that ANTARES was lost by capsizing as a result of having her nets snagged by HMS TRENCHANT. This conclusion has been accepted by the Ministry of Defence. The tragic loss of life is very much regretted.

8. Amongst a number of contributory cases, the Board of Inquiry considered that there were some procedural and personal failings onboard HMS TRENCHANT. However, the extent to which particular personnel may be considered to have been culpable, and the seriousness of any individual culpability, are matters which are the subject of continuing consideration by the Commander-in-Chief Fleet and it is therefore not appropriate to comment further in this summary.

9. The Board of Inquiry also identified some aspects of policy and procedures and of submarine equipment which in its view required review. In this connection it recommended: adjustments to command and control arrangements when the Submarine Commanding Officers' Qualifying Course is embarked in a submarine; an assessment of the capabilities of submarine sensors to detect fishing vesels and to assess their range; a review of operational policy in shallow waters; a redoubling of effort to deconflict submarine operations and civilian traffic; a review of the guidance given to submarine Commanding Officers when in the vicinity of fishing vessels, including the actions to be taken following an incident; and a major effort to establish and promulgate the lessons of the sinking. These recommendations have been followed up.

Actions taken

10. In the light of the sinking and of the Board of Inquiry report, the Flag Officer Submarines, the Commander-in-Chief Fleet left and the Ministry of Defence have already taken a number of actions designed to ensure that, as far as possible, such incidents can be avoided in the future;

(a) The policy of operating dived submarines close inshore has been reviewed. The need for such operations has been confirmed as a necessary means of preparing the submarine flotilla to operate in the shallow waters of the Continental Shelf and the Northern Seas. However, in future greater emphasis will be given to training for increased safety in inshore waters and this will be reflected in the syllabus of Submarine Commanding Officers' Qualifying Courses.

(b) Efforts to improve safety in waters frequented by submarines and fishing vessels have been stepped up. A scheme for the notification to fishermen of the areas and times of planned submarine activity within the Firth of Clyde has been operating successfully since 17 December 1990 and consideration is being given to the feasibility of extending such schemes to other inshore submarine operating areas. It is planned to make an announcement shortly.

(c) The command and control arrangements when the Submarine Commanding Officers' Qualifying Course is embarked in a submarine have been reviewed and updated guidance has been promulgated.

(d) The guidance and instructions to submarine Commanding Officers on operations in the vicinity of fishing vessels and the actions to be taken if involved in an incident have been reviewed and revised procedures are now in force. Commanding Officers have been instructed to avoid vessels engaged in fishing by as much distance as is navigationally prudent and to make communicantion on VHF radio with fishing vessels operating in close proximity whenever possible.

(e) The lessons of the ANTARES sinking are being taken into account in considering the equipment fit of future generations of submarines and the continuing programme to improve the equipment fit of existing classes. Initial studies have been commissioned to address ways of providing submarines with better equipment for establishing the range of fishing vessels.

(f) The Royal Navy has carried out trials of a fishing net pinger device and these have been shown that such a device could, with some limitation, help submarines to detect the presence of trawl nets. The Ministry of Defence is consulting the Department of Transport and the Ministry of Agriculture, Fisheries and Food over the possible use of such devices by fishermen and is also planning to seek the views of representatives of the fishing community.

Further actions will be taken, as necessary, in the light of the outcome of work still in hand and, where appropriate, further announcements will be made.

8. Declassified extracts from previously submitted evidence by the Ministry of Defence

Following exchanges with the Committee regarding the classification of evidence on the Royal Navy's, nuclear submarines and printed with the Committee's First Report of session 1990–91 (HC69), the Ministry has agreed to the publication of the following:—

The Ministry of Defence estimates that the total out-turn costs for refit work on HMS WARSPITE and HMS CHURCHILL will together be in the region of £160M (Vote 5 expenditure).

The Ministry of Defence would expect the average cost for decomissioning a nuclear submarine to be in the region of £10M to £12M (at 1990–91 prices) Further dockings, estimated to cost somewhat in excess of £2M (at 1990–91 prices), would be planned at about ten yearly intervals pending final disposal.

The Royal Navy's nuclear submarines are being inspected and cleared for operations as required to meet military commitments.

The Ministry of Defence has confirmed that one other submarine (HMS CHURCHILL) has been found to have a technical defect comparable to that discovered in HMS WARSPITE; neither submarine was beyond economic repair.

9. Memorandum submitted by Admiral Sir John Woodward (23.1.91)

SIZE AND SHAPE OF THE SUBMARINE FORCE

1. Assumptions

a Defence Policy requires the military means to deter interference with our national interests wherever that may occur.

b Such means include the maintenance of the TRIDENT force.

c Once basic needs for home defence have been met, provision must include the maintenance of a capability to transport substantial ground and air forces by sea, and to prevent others from acting against us, in similar scale, over a period of at least months, at short notice.

d While we would seek to do all the above in concert with allies, we would nevertheless wish to maintain a unilateral capability to do so, world-wide, at Divisional level and including airborne and amphibious elements.

2. Submarine Force Tasks

a The Surface/Subsurface/Air balance of the Royal Navy is the subject of a larger debate. But, if the assumptions at para 1 are broadly correct, the tasks, in order of priority, of the Submarine Flotilla will be:—

(i) Deployment and protection of the national nuclear deterrent [SSBN force).

(ii) Interdiction of opposing surface forces.

(iii) Interdiction of opposing sub-surface forces.

(iv) Clandestine operations.

(v) Trials and training to support the above.

b For the above tasks:—

(i) Only SSBNs can deploy the national nuclear deterrent.

(ii) The SSN is far the most suitable for the protection of the SSBN foce, and for tasks a. (ii) and (iii). Furthermore, it is capable of rapid, covert deployment over long distances. It can also perform tasks a. (iv) and (v) entirely adequately.

(iii) The SSK is best suited to tasks (iv) and (v), but, lacking a sustained high speed capability is relatively ineffective at tasks (i) and (ii). But because capital and running costs are considerably less than those of an SSN, it will often make sense to use an SSK in lieu, eg in high risk inshore operations, in comparatively static operations and in non-combatant operations. It is also the only export prospect.

3. Minimum Force Levels

a The SSBN operating cycle, with a single hull insurance against accident or enemy action, requires a minimum of four hulls in service.

b (i) Having funded the SSBNs, it will make best economic sense to maintain an SSN force commensurate with using the SSBN facilities to their maximum. If the nuclear facilities at Rosyth are completed and those at Devonport retained, this will support a substantial SSN force. If only Devonport is retained, a smaller SSN force (about 6 hulls fewer) could be supported. If Rosyth is completed and Devonport run down, the SSN force would have to be a smaller again.

(ii) There is a minimum single "Stream" build rate which is in the order of one hull every two years—this leads to a minimum nuclear submarine force level of about twelve hulls, inlcuding SSBNs. The two year assumption is a critical figure and needs to be substantiated.

(iii) The likely on-station operational need is for one SSN in SSBN support, and three in Fleet support. This suggests a minimum SSN force level of twelve to sixteen hulls, depending on distance from home bases. Reduction of the operational task by one on station in Fleet support will reduce this requirement to between nine and twelve SSN hulls.

c While the minimum SSK force level is plainly zero, it will make (subjective) good sense to operate the four new hulls for trials and training tasks. It will also make sense to retain their capability for battle at least as long as that requires no further major expense.

4. Conclusions

a Four SSBNs should be provided.

b The four hulls of the new class of SSKs is a reasonable level at which to cease production

c Funds remaining availabvle to the submarine force should go to SSNs. The cost-constrained minimum SSN force level is eight hulls (subject to verification). The demand-lead SSN force level is between twelve and sixteen hulls.

10. Memorandum submitted by Rear-Admiral John Hill (23.1.91)

SIZE AND SHAPE OF THE UK SUBMARINE FORCE

Pre-Options for Change

1. Statements on the Defence Estimates from 1984 onwards were reticent on the planned size and shape of the submarine force but it appeared that the Government had in mind a steady state, around the year 2000, of 16 nuclear powered fleet submarines (SSN) and 12 conventional submarines (SSK) of the 'Upholder' class.

2. The rationale for such a force was never stated in public in any detail but SDE 1985 (para 433) gave some indication: SSNs were 'extremely potent and cost-effective naval units' and SSK 'provided a powerful capability against ships and other submarines'. This paragraph was in a NATO and an ASW context.

3. Wider reading than the SDEs indicates the following components of the rationale:

(a) to provide maximum affordable numbers of submarines as ASW assets against a Soviet threat to shipping;

(b) to contribute significantly to the US (forward) maritime strategy;

(c) to provide occasional support for SSBN operations;

(d) to provide live training, pro- and anti-submarine;

(e) to conduct surveillance and intelligence gathering;

(f) to keep the building stream at VSEL occupied.

4. I have no means of knowing how, in the 1980s, this rationale was converted into numerical requirements. But from previous experience it seems likely that the numbers were driven by (f) and justified principally by (a), with increasing emphasis on (b) as the US Maritime Strategy was embraced by the Naval Staff. NATO Force Goals generally follow, rather than lead, national plans and can be regarded as *post hoc* justification only.

Post-Options for Change

5. The Options for Change decisions lead to a steady state around the year 2000 of 12 SSN and 4 SSK, though the latter figure has some latitude for more. The 'number of reasons' referred to by Mr Mottram on 5 December 1990 (Q.450) presumably include manning and training as well as operational considerations but do not necessarily undermine the rationale at para 3 above, particularly as the US Maritime Strategy's more extreme forward policies fade, and observing that VSEL post-Trident is open for submarine refitting and maintenance business.

A Different Approach

6. The Committee will not be surprised if I now adopt a less orthodox approach, based upon national as much as NATO needs, and following the lines of thought in my submission on the Surface Fleet (your Sixth Report, 21 June 1988, pp.111–113). They will not be repeated here. It is necessary to say only that analysis depends on two main factors: level of conflict (Normal Conditions, Low Intensity Operations, Higher Level Operations, General War) and Reach (distance from home base at which operations can be carried out).

Uses of Submarines

7. In normal conditions, both SSNs and SSKs are important components of all-level deterrence, and their reach (common to SSN and medium-sized SSK) gives this an added dimension. They are also essential for live training in any balanced navy, and give an excellent covert intelligence gathering capability whose political limits are fairly well establised. Support for SSBN is a task about which I am not qualified to comment. For many of the tasks above, SSK are as valuable as SSN (numbers are the requirement) and the necessary graduations of training both pro- and anti-submarine suggest that a ratio of 1:3 SSK:SSN is low.

8. In low intensity operations, as I have previously observed (Sixth Report, p.113, last paragraph; 'power' in line 6 should read 'poor') submarines are of relatively low operational utility. They may be useful in surveillance and intelligence gathering but their principal value is deterrent; they are fine sticks to shake, threatening escalation to the higher level which may be unacceptable to an opponent.

9. At the higher level, submarines come into their own. Their relative invulnerability, lethal weapon systems and autonomy lend themselves to warfare which is military in aim and less trammelled by rules of engagement. Their easiest task is against surface ships, and it is notable that in no higher level operation since the Second World War have submarines been seriously deployed in the ASW role. It could be said that this is simply coincidence; an acute threat from submarines appeared neither in Korea, nor in Vietnam, nor in the Indo- Pakistan wars, nor in the Arab-Israeli wars. But it did (or at least it was taken seriously) in the Falklands; and we have not been told that British submarines were deployed in the anti-submarine role there. I return to the ASW role at paras 14–16 below.

Tasks Short of General War: Summary

10. The requirement for operational submarines in tasks short of general war is driven by the numbers needed for normal conditions and for higher level operations, some of which may have to be undertaken without allies, and for others of which a balanced UK force will be needed.

11. The higher level calculation is the easier. Three SSN are surely sufficient to protect a UK task force against medium- power surface attack; watch and ward on bases and approach routes can be provided by SSK and here my own view is that three in the operational area is also a reasonable number. The well-known ratio that requires a total force of 3 to sustain one in a distant operational area gives a force level of 9 SSN and 9 SSK.

12. Normal conditions require a more complex calculation. But even allowing for quite extensive intelligence gathering and SSBN support operations, it is hard to see how a requirement of 9 SSN can be exceeded, observing that the operational areas are relatively close to the home base and the 3-for-1 factor does not therefore apply. Also, 9 SSK would seem ample for training and exercise tasks, both pro- and anti-submarine, in national and alliance contexts.

General War

13. So many questions now surround the concept of general war that it is hard to generate any sensible numerical requirement from it. But, because it has been the basis for force structures for so long (and not only in the maritime sense) it still needs to be considered. The best support for this admittedly worst-case line of thought is the acknowledged fact that Soviet naval strength has not significantly dwindled. Circumstances could conceivably arise where its use was contemplated, in spite of the loss of readily available Soviet land offensive capability. A major question then would be whether in such a situation the US Maritime Strategy had any remaining validity. If it did, then UK SSNs might be required in the kind of numbers planned before 'Options for Change. The Arctic is a large sea, under-ice operations are difficult and hunting SSBNs is a highly uncertain art.

14. It is precisely here that the *operational* doubts about the Maritime Strategy (to say nothing of political doubts which surely must loom large in the new strategic situation between the USA and USSR) come to the fore. Hunting for submarines, by whatever ASW vehicle, has historically proved an unrewarding task. Under the ice against quiet submarines, it is likely to be fruitless, a dreadful waste of resources. It is significant that Richard Compton-Hall, in his book *Submarine versus Submarine,* had to manufacture situations that produced encounters between modern submarines; simple meetings between well-handled boats, intent on avoiding detection, would happen so infrequently that describing them would be unrealistic. Compton-Hall is an ex-submariner and a deep student of submarine warfare.

15. If then the SSBN-hunting element of general war is abandoned or reduced to a token effort, what is the role of the Royal Navy's submarines in general war? SSNs are likely to operate in support of task groups based upon CVS, either with the role of ASW support of the US Srike Fleet or of convoy protection in the deep field. This is where, particularly when equipped with towed arrays, SSN can take advantage of the tactical movement imposed upon enemy submarines by the actions of convoys and other shipping. (I don't like plugging my own work, but see *Anti-Submarine Warfare* (Ian Allan, 1984), pp. 102–103, for a more detailed explanation).

16. There would also be a role for SSN in ASW barriers if these were required, as they probably would in say the G-I-UK gaps. But the main work in the barriers would fall to SSK and UK boats, with their deep-sea endurance, would certainly be important here. It should not be forgotten that boats in barriers could also have an anti-surface vessel role.

17. In summary, general or alliance war appears less and less likely to generate any requirement greater than for national (or ad hoc coalition) operations. The question 'how big is a contribution?' which always dogged us in NATO planning tends to fall away. But a force of 9 SSN and 9 SSK would certainly be welcome to any alliance.

Western European Union

18. WEU has come to prominence as a means of co-ordinating military (particularly naval) activities 'out of area'. It has proved very useful in that role. But it does not generate force requirements and can be discounted for the purposes of this paper, except as an example of the kind of coalition to which balanced national forces might be attached.

Comparisons with Other European Navies

19. I once said the RN was 'the most submarine-orientated navy in the western world', and perhaps should try to substantiate that. Table 1 shows the comparison. Observing that Germany's submarine force is conventional and consists mostly of small units, and that Britain's force is so weighted towards SSN—heavy in capital cost, maintenance and training—I believe the case stands, on the current figures. The balance I now propose would bring the UK closer to the European norm—for what that is worth.

Arms Control Factors

20. The exclusion of naval forces from arms control arrangements cannot go on for ever. The most promising areas, when negotiations eventually start, are Confidence Building Measures and the reduction or elimination of tactical nuclear weapons at sea. These would both be stabilising and, if sensibly pursued, would be in the West's interests. Structural measures are probably undesirable, in the interest of stability no less than of power, but it is notable that the most popular type of structural limitation put forward by western commentators concerns SSNs. They argue a stabilising trade-off—less threat to Soviet SSBN from western SSNs, less threat to western shipping from Soviet SSNs. I do not hold this view myself, but think it may gain credence. Against that possibility, as well as other contingencies not covered above (eg a resurgent, militarist USSR) it may be worth keeping a further three SSNs in reserve.

Conclusion

21. The optimum UK steady-state submarine force around the year 2000 would be:

9 SSN (Trafalgar and later 'S' classes, the latter being replaced by SSN-20)

9 SSK (Upholder class)

with the option of three further SSN in reserve.

This should be enough for national and ample for alliance tasks, with resource benefits in materiel, manpower and training terms.

TABLE 1

COMPARISON OF EUROPEAN SUBMARINE/ SURFACE SHIP STRENGTHS

A *Country*	B *Submarines*	C *Principal Surface Combatants*	D *Ratio and Ranking*	*(B/C)*	E *Patrol and Coastal Craft*	F *Ratio and Ranking*	*B/ (C+E)*
Canada	3	19	.16	(12)	12	.10	(9=)
Denmark	4	3	1.33	(3)	40	.09	(11)
France	4N, 10K	44	.32	(11)	24	.21	(6=)
Germany	24	14	1.71	(2)	45	.41	(1)
Greece	10	19	.52	(6)	36	.18	(8)
Italy	10	30	.33	(10)	17	.21	(6=)
Netherlands	5	14	.36	(9)	0	.36	(2)
Norway	12	5	2.40	(1)	38	.28	(4)
Portugal	3	8	.37	(8)	27	.07	(12)
Spain	8	19	.42	(7)	60	.10	(9=)
Turkey	15	22	.68	(4)	46	.22	(5)
UK	17N, 11K	50	.56	(5)	44	.30	(3)

Source: The Military Balance, 1990-91 (IISS, London).

11. Memorandum submitted by Vice-Admiral Sir Ian McGeoch (23.1.91)

AIDE-MEMOIRE

Royal Navy submarines

References:

1. Clerk of the Comittee's letter dated 20 December 1990, and enclosures.

2. Defence Committee's *Sixth Report:* 'The future size and role of the Royal Navy's surface fleet' (21 June 1988) Appendices 15 & 16

General considerations

1. Military threats to national security arise when hostile political intent and potentially overwhelming military force are combined. But, whereas political intent may change almost overnight, as recent events in Eastern Europe and the Middle East testify, military capabilities do not. Though warning time may be extended, surprise must be guarded against.

2. As pointed out in Ref: 2 (p.153):

> too great an investment in the strategic objectives within the NATO area, where collective defence is assured by the Treaty, may result in too little in respect of those outside the Treaty area, where there is no formal commitment to, or organisation for, collective action other than *ad hoc* support of UN resolutions.

In summary, key stategic objectives are:

> Defence of the UK against bombardment (other than by long-range ballistic missiles, against which no defence is feasible and reliance must be placed upon the SSBN deterrent)
>
> Defence of the UK against invasion
>
> Maintenance of uninterrupted use of the sea for whatever purposes are indispensable to national survival and the successful prosecution of war, and in peacetime to provide 'a security for such as pass on the seas upon their lawful occasions'
>
> Assurance of continued access, on politically and economically acceptable terms, to indispensable supplies of food, fuel and raw materials
>
> Preservation of the integrity of sovereign territory, air-space, territorial seas, fishery regimes and EEZ
>
> Aid to the civil power for the preservation of public order and internal security, in areas of British responsibility, and disaster relief

3. The foregoing strategic objectives are defensive, as befits a nation that has repudiated the use of armed force except in response to aggression. But, once attacked, there comes into being an additional first order strategic objective, to which the exercise of military strategy must accord primacy if the key defensive objectives are to be secured. The hostile armed forces must be destroyed or neutralised.

4. It appears from the enclosures to Ref: 1 that HMG has not abandoned the policy for which Mr Nott, in his day, took responsibility, namely the imposition of cuts on each Service separately, and within each Service on each type of weapon separately. In the case of the Royal Navy, for example, the options for change studies, as presented to the Defence Committee of the House of Commons, appear to have ignored the fact that for the past half-century or so naval warfare has been sea-air warfare. By the Inskip award of 1937 the Royal Navy's air arm may consist only of aircraft operated from ships; any other aircraft with a naval role must be part of the Royal Air Force. Since the close, continuous and creative combination of all arms is the *sine qua non* of modern warfare, the Army, the Navy and the Air Force today are in a sense 'type commands', and hence the operational needs (and procurement policies) of all three Services should be determined by the MoD on the basis of military, rather than land, sea or air strategy independently. Submarine requirements, for example, must to some extent be governed by the prevailing balance of submarine versus anti-submarine warfare, for which the RAF has an important degree of responsibility and hence experience and knowledge both of current practice and expected developments. Is the RAF to be represented expertly at the Defence Committee's enquiry into Royal Navy submarines?

The tactical submarine

5. Given the existence of submarines armed with long range nuclear armed ballistic weapons classified as 'strategic', submarines not so armed may be termed 'tactical submarines' whether armed with cruise missiles, torpedoes or mines. Common to all submarines is the capacity for concealment. The preferred mode of attack is to achieve surprise, acquiring as quickly and accurately as possible the data necessary for successful weapon control, then to evade counter-attack by further concealment in the depths.

6. Although the submarine which wishes to remain concealed in the ocean depths may do so, one whose mission requires it to maintain a high speed of advance, whether on distant deployment or to attain a good firing position, risks detection by acoustic means operated by another submarine, a surface ship or an aircraft. Detection of what may possibly be a submarine has to be followed by measures to locate precisely the source of the detected noise signature and its classification, whether 'non-sub', probable submarine or confirmed submarine, specifying type and even class in some cases. Only then may a deliberate attack take place, the principal weapon being the anti-submarine torpedo.

7. A submarine on anti-submarine patrol, lying in wait for enemy boats deploying, will rely on passive sonar, since to use active sonar would alert the target. Hence every effort has been made to render submarines as near noiseless as possible. It is necessary for planning purposes to accept that potentially hostile submarines may be at least as quiet as our own. That being so the outcome of a submarine versus submarine campaign would be indecisive; the use of active sonar in order to overcome the problem of the 'silent' submarine had the obvious disadvantage of giving away the presence of the patrolling submarine when the target was too far away to be detected.

8. With the advent of nuclear propulsion it became feasible to equip submarines with powerful active sonar. Being capable of sustained high speed whilst remaining fully submerged these boats could operate in close support of surface warships or convoys, since detection of their sonar by an attacking submarine would either deter it from pressing home its attack or risk detection unless its effective weapon range was greater than sonar detection range. The term 'fleet submarine' was introduced to categorise the nuclear-powered general purpose submarine which, however, enjoys in marked degree the unique submarine capability to operate independently in waters where surface warships would be open to any unacceptably high scale of attack.

9. In order to determine whether or not the Royal Navy's submarine fleet should include diesel-electric (SSK) 'patrol' boats as well as 'fleet' boats (SSN), and if so in what proportion, it is necessary to consider the range of tasks in peace and war for which submarines may be required, having regard to the key strategic objectives given in paras 2 and 3 above:

(a) Reconnaissance and intelligence gathering including tracking.

(b) Anti-submarine patrol including towed array operation.

(c) Anti-submarine support for surface forces or convoys.

(d) Attack on surface warships or supply ships and transports.

(e) Minelaying.

(f) Bombardment of high value targets (on land) using cruise missiles.

(g) Clandestine operations.

(h) Training anti-submarine forces.

10. The priorities to be accorded to these tasks both in relation to British strategic necessities and to each other have to be determined in the light of:

(a) Maintenance of the strategic nuclear deterrent i.e. Polaris/Trident

(b) Optimum contribution to national capabilities in peace and allied strength in war.

11. In regard to 7.a above support of Polaris/Trident operations during peace and periods of tension or hostilities is the first priority task for Royal Navy submarines. Owing to the high degree of secrecy called for the judgment of HMG as to the number and type of naval and air forces required for this support must be accepted.

12. In regard to 7.b the current and foreseeable future weapon environment in which use of the sea will have to be contested is one in which missiles of varying degrees of range, precision and explosive power, launched from aircraft, surface ship, submarine or land will be brought ro bear upon shipping and warships, which will use counter-measures of various kinds both for area and close-in defence. So long as the submarine remains fully submerged (which in the case of the nuclear-powered submarine is indefinitely, subject to crew endurance) it canot be attacked by air-borne missiles (other than airborne torpedoes or nuclear-armed depth charges). Hence the bias towards anti-air configuration in surface warships (vide ref. 1 enclosue p. 16) as against anti-submarine indicates a corresponding trend towards the use of submarines to provide the anti-submarine close support for important surface forces, transport and supply ships. The anti-submarine defence must, in response to the over-the-horizon missile threat, be extended correspondingly in range, in part by the deployment of towed array sonar, for which either fleet (i.e. nuclear powered) or patrol (i.e. diesel-electric) boats may be used.

13. As to attacking hostile surface naval forces, which now might include fixed-wing aircraft carriers, the existence of fleet submarines poses a threat ocean-wide which an enemy could not ignore. Patrol submarines, which can operate effectively in sea-depths too shallow for fleet submarines, can augment the threat to enemy sea-use accordingly.

The more appropriate the shape and size of her armed forces to her situation and her key strategic objectives the more likely is Britain to be left in peace or, if threatened, to find allies. Where no specific and immediate threat of armed attack may be apprehended the greatest danger to national security lies in over-expenditure on the standing armed forces leading to social unrest and political instability.

15. Expenditure on the armed forces should therefore be the maximum which is sustainable indefinitely whilst making provision for rapid expansion when deterrence of potential aggression is called for.

16. As outlined in Ref: 2 (p. 163) the Royal Navy, as a whole, should comprise:

Main battle force—three 'harrier-carrier' groups (inc. 12 frigates)
Ocean escort force (12 frigates)
Patrol force (12 corvetees—to operate mainly within shore fighter defence)
Amphibious force
MCM force
Logistic support force
Fleet and patrol submarine force
Trident

Plus RAF reconnaissance, fighter defence, AEW, maritime strike, and anti-submarine (both fixed-wing and helicopter) forces.

17. In considering the strength and composition of the Royal Navy submarine force as an element in the Fleet suggested in para. 14 above we require to have estimates of the through-life costings of each type of boat in terms of the total cost per unit for each day available into service. The submarine tasks set out in para. 6 above should then be divided into:

(a) Those which can be carried out only by a fleet boat e.g. direct support of surface naval forces or convoys.

(b) Those which can be carried out only by patrol boats e.g. operatons in shallow seas.

(c) Those which may be carried out either by a fleet or a patrol boat.

Conclusions

18. *Options for Change* postulates (Ref: 1—enclosure) by 1995:

SSNs 'around 12'
SSKs 'around 4'
Surface Fleet 'around 40'

It is evident from answers to various questions put to Mr Mottram by the Defence Committee that the MoD having 'sized the Royal Navy in relation to the future scale of the risks of a major war in Europe' has discovered that, as luck would have it, the outcome is a Fleet, of the numbers given above, which would be the maximum sustainable size in political terms for the foreseeable future (vide the answer given to Question 301). The fleet and patrol submarine element of the 1990 Fleet consists of 16 SSNs and 10 SSKs; by 1995 this total of 26 hulls is to be reduced to 16.

19. No explanation has been given by the MoD to the Defence Committee of the reasons for a reduction in the submarine force (Polaris/Trident apart) of 60% by 1995 against a reduction in the frigate/destroyer force of 20%.

20. The absence of any convincing argument to support the figures produced under 'Options for Change' is reminiscent of the answer given by a Petty Officer being examined in the 1880s in HMS *Vernon*. When asked 'What is II?' he replied '3.1416 recurring, Sir '. . . .' Yes, but why that number?'. 'Because Captain Fisher says it is a very suitable one, Sir'.

21. No doubt HMG, in determining the shape and size of the armed forces we require in the post-Cold War era, has considered afresh how to maintain the specific, abiding, national strategic objectives (vide paras 2 and 3 above) which must be secured by our own efforts, with allies, or as part of the concert of nations, depending upon the character, direction and scale of the threat. Absolute national security is unattainable, hence a stable international order must be under-pinned by armed forces. But international security requires that such forces should be no more powerful than is indispensible to the preservation of legitimate strategic objectives. Given the state of military technology it is evident that as far as Britain is concerned submarines—both nuclear-powered 'fleet' boats and diesel-electric 'patrol' boats—remain cost-effective for both defensive and offensive roles in peace, times of strained relations, and in war. The minimum depth of water in which a submarine can operate without restriction is of critical importance in assessing the comparative utility of nuclear-powered and diesel-electric boats. This, coupled with through-life costing per operational day, should be taken into account when assessing the optimum proportion of each in the Royal Navy's submarine fleet.

12. Memorandum submitted by Commander R Compton-Hall, Director of the Royal Navy Submarine Museum (8.3.91)

FUTURE SUBMARINE POLICY

Abstract

The Royal Navy's 27 or 28 attack-type submarines (SSNs and SSKs) have been hard pressed to meet commitments over the past decade: Options for Change proposes a 40 per cent cut; but commitments will scarcely be lessened (1, 2, 30-39, 42, 77, 85-88).

A unique attribute of submarines is that they can patrol, ready for war, on a potential enemy's doorstep without provocation. Alternatively, their presence can be advertised: they then become an effective deterrent (6-8).

The Soviet submarine threat is not diminishing: ASW submarines (which contributed largely to winning the Cold War) are the foremost units to guard against it and give early warning (7, 42).

Other underwater threats will become more widespread (42).

The Arctic where only air-independent submarines can operate freely, will be an area of future underwater conflict (43).

Planners/designers should look 25 years ahead. Big technological steps are therefore sensible (10-14).

Air independent Propulsion (AIP) for small submarines deserves more attention (53-56).

There will be a serious shortfall of personnel unless pay and facilities ashore are improved, and home-port programmes are made more predictable (75-83).

A European Submarine Development Squadron should be instituted (70-72).

Midget submarines are strateic in concept—not miniaturised tactical svstems. The Royal Navy should consider readopting midgets (62-69).

The Royal Navy needs, in future, thirteen SSNs and eight SSKs (84-94).

Options for Change

1. The proposed reductions in the submarine fleet, under Options for Change, result in a Flotilla strength of twelve SSNs, four SSKs and four SSBNs. The sixteen attack-type submarines now envisaged represents about a 40 per cent cut in the near future and 30 per cent in plans for the next century. It also means that SSBNs will comprise twenty per cent of total hull numbers although, of course, their capital and running costs are proportionately much higher and their two crews are larger.

2. The 27 or 28 attack-type SSNs and SSKs in the Flotilla over the past decade have been hard-pressed to meet commitments. The discussion that follows suggests, amongst other things, that those commitments will not significantly lessen.

3. This paper deals only with SSNs and SSKs: a separate discussion can be prepared on related implications of the Trident fleet for personnel, maintenance, refit, basing and operational support.

Submarine attributes

4. *Venio non videor*—I come unseen—is the motto of the Royal Navy's Submarine Service. Today, it could equally be "I come unheard" although, unfortunately, that is also the claim of submariners elsewhere.

5. Given that an attack-type submarine is quiet and well handled, as well as having a credible weapon system, it has particular attributes that too often go unrecognised. British submariners are not good PR merchants: see Annex A.

6. *First*, a submarine can patrol on a potentially hostile doorstep, fully ready for war, without being provocative—something that surface ships and airborne units can seldom do. ("Submariners do it less provocatively!")

7. *Second*, while there, it can gather invaluable intelligence and give early warning—again without provocation.

8. *Third*, if its presence is deliberately advertised as an alternative ploy, it can act as a powerful deterrent. The true meaning of submarine deterrence (which has nothing to do with ballistic missiles) was, of course, exemplified during the Falklands conflict when, after the sinking of *General Belgrano*, the Argentinian surface fleet did not dare venture out to sea in the face of British submarines.

9. On the other hand, a submarine is not ideal for "showing the flag" in traditional fashion and a nuclear vessel is not everywhere welcome; it can not contribute towards the air defence of a surface force or convoy; and it may be inhibited, depending upon circumstances, in sending messages to shore. As currently conceived, it is expensive to build; but its life-cycle is economical and most Submarine Flotilla revenue goes to the sharp end. Of all submarine personnel under FOSM 80 per cent are sea-going and only 20 per cent are concerned with shore support.

Submarine Development

10. Practically any military system takes twelve years to develop from a "good idea" to hardware and a further three years to put it to work. There have been exceptions and actual war is a hastener; but that time-span is a reasonable rule of thumb.

11. Hardware (eg a submarine) must serve for some twenty years in order to amortise the initial cost acceptably.

12. It is therefore necessary to look far ahead when devising a new weapon system: planners must have their eye on the distant horizon and not confine their ideas to what lies just in front of them. That is also true of political chess—but Russians are more skilled at that than Westerners: see Annex B.

13. The implication is that if planners and designers are to take a step forward it may as well be a big one; and it must be guided by moves on the big chess-board. Nevertheless, in Western navies evolution (minimum risk) is preferred to revolution. Evolution in the RN means that each new submarine is different from (and hopefully better than) its predecessor: that is partly why the Submarine School runs 200 separate courses.

14. The logical steps for submarine development are:

(i) Judge the threat (with political advice) at least twenty-five years from now. Agreed, that is difficult—but we ought to try.

(ii) Determine the best weapon system to deal with it.

(iii) Determine the best vehicle in which to integrate that weapon system.

(iv) Create a vehicle that is sufficiently flexible to permit modifications to the weapon system if such prove necessary.

15. These steps have seldom, if ever, been followed.

Weapon systems

(Annex C lists current weapons in five navies.)

16. British submarines have no land-bombardment weapons (other than the nuclear ballistic missiles in SSBNs) but they are very desirable for the future. Submarine-launched cruise missiles (SLCMs) would be splendid for deterrence (although probably not against a major nuclear power) and they are demonstrably precise if used for actual attack: like American Tomahawk, they can be nuclear-tipped or conventional. Although the two versions of Tomahawk have different bodies and ranges it should, a few years from now, be possible to convert an SLCM from high explosive to a nuclear warhead onboard at sea (this is feasible with sub-kiloton insertion nuclear component torpedoes—SKINCs). Nuclear arms control difficulties arise but they may not be insurmountable.

17. However, cruise missiles need their own maps (tapes) for self-navigation and those would not be easy to compile unilaterally.

18. Current Tigerfish and forthcoming Spearfish torpedoes are good for most, albeit not all, purposes; but doubtless better, faster guided/homing "fish" could be produced if there were no size constraints.

19. Torpedoes—of some kind—will cope with the majority of conceivable future targets although a disabling "mission kill" may have to be accepted rather than destruction. Nevertheless, missiles will still be needed for certain targets including very high-speed warships, hovercraft and the like. The requirement for an ASW missile (implying a nuclear warhead like the now redundant USN SUBROC) or a missile-borne torpedo is less apparent in light of detection ranges, and firm contact ranges for engagement, becoming shorter.

20. An anti-aircraft missile (the Russians have at least one submarine SAM, probably mounted in "Tango" and perhaps "Kilo" SSKs) is desirable and may soon be essential: SIAM is the promised American version. ASW helicopters are especially troublesome and airships may again become so.

21. It would be good if submarines could carry mines externally in order to free space for other weapon systems. The suggestion might at least stimulate naval architects into thinking once more about double hulls which, as the Soviets believe, offer a degree of protection against underwater weapon systems and help to reduce radiated noise.

22. It would be wise to start thinking seriously about small, autonomous, unmanned vehicles which a submarine could despatch (possibly retaining control by means of fibre-optics) to reconnoitre, gather intelligence or make an attack in a situation where it could be unduly dangerous for the submarine itself to proceed further. The technology is available and the cost would not be prohibitive (about the same as three USN Mark 48 ADCAP torpedoes). These may be the only real solution to under-ice engagements where a standard homing torpedo is apt to be decoyed by keels, ridges and ice-noise.

Reliability of weapon systems

23. In the words of Vice-Admiral Eli T Reich USN, "there is a tendency to forget that, in the end, it all comes down to placing an ordnance package alongside the other fellow ... and making sure that it explodes!"

24. Reliability, or effectiveness, should be the benchmark: the heavy-warhead, non-homing type of torpedoes with which HMS *Conqueror* sank the *Belgrano* had been in service for half-a-century; but they were deliberately employed rather than the then relatively new Tigerfish. Tigerfish eventually became reliable (if still not sufficiently effective) thanks to Marconi (MUSL) taking over management of the entire system from fire control through weapon handling, discharge, weapon-guidance, impact and fuzing: in other words, it was at last recognised that a weapon must be integral with the submarine as a whole. Defence establishments had not achieved that: only a commercial firm was able to bring everything together.

25. All the same, it is a fair bet that not enough effort (money) is devoted now to realistic exercises involving entire weapon systems in actual firings—which are the only continuing proofs of the pudding. If that is supported by enquiry (supposing that Squadron Staffs speak frankly) one reason, apart from the price of weapons, will be that there are not enough submarines to practice with.

26. Visits to the AUTEC range, a three-dimensional facility which records interactions, are invaluable; but it is a long way to the Bahamas.

27. The encouraging results with missiles and smart bombs in the Gulf are not necessarily indicative of equally good results with underwater weaponry which has to cope with the vagaries of sound in the sea.

Comparative SSN and SSK costs

28. An over-ambitious design can milk the cash-box at an alarming rate; but the thief is seldom recognised, let alone apprehended, in time. The 2455-ton "Upholder'-class SSK is a case in point. In the 1960s it was agreed that diesel-electric submarines (SSKs) were not worth the candle unless we got five for the price of one 5000-ton SSN with existing support facilities more or less sufficing. For some reason, presumably the projected size of the new design, the ratio was later declared to be three-to-one; but when the "Upholders" appeared even that was not achieved. This should not have surprised anybody because, if expensive weapon systems are similar in comparative classes, submarines are still costed pretty much by the ton whether nuclear or not: an "Upholder" SSK is nearly half the displacement of a "Trafalgar" SSN and its weaponry is not much different. (Nevertheless, despite special maintenance buildings at HMS Dolphin for the "Upholders', shore infrastructure for SSKs is much cheaper than that required for SSNs.)

Submarine Roles

29. A submarine is remarkably versatile and entirely self-sufficient for extended periods at sea. It can switch from one role to another on command—notably from peacetime intelligence-gathering/surveillance to attack—and there is not much difficulty (given an adequate stock of weapons at the Base) in keeping it stored for war. The fact that its greatest (and constant) enemy is the sea itself ensures that the crew maintains an exceptionally high state of efficiency.

30. For a long time submarines have had *ASW*—the hunting and destruction of their own kind—as the foremost task. History indicates that a barrier concept is less than effective; but Cold War roaming commissions in focal areas have been fruitful. There are questions to be asked about the productivity of future submarine-versus-submarine operations in the open ocean: what will be the realistic probability (unless cued by intelligence) of detection, classification, interception and kill against stealthy submerged enemies? Will enough ASW submarines be available to cover wide areas?

31. Clandestine *minelaying* is a valuable role but is not popular with submariners because it can take a boat into dangerous waters and results are not immediately apparent. Submarine minelaying may well be employed by a navy that wants to avoid blame for a hostile act; and mines can nowadays be laid in deep as well as shallow water. (What if the USSR had chosen to interfere, clandestinely, in the Falklands Conflict in this way? What if Libya decides on covert minelaying in support of the PLO against Israel now?)

32. *Anti-ship* operations are always possible: the Mark 24 Tigerfish torpedo is dual-purpose (submerged and surfaced targets) but the explosive charge is small and not likely to do much damage to a heavy warship or sink a double-hull Soviet submarine. Spearfish, with a directed energy charge, should be much better. The Sub-Harpoon missile is anti-ship only and widely favoured—but when taking flight it reveals the firing submarine's position: relatively immobile SSKs are not, therefore, very keen on it.

33. Substituting SSNs for surface escorts in *ASW support of a surface force or convoy* has been tried in exercises but the practicalities are dubious except, probably, in distant support. Mutual interference (friend attacking friend) is a possibility in war.

34. *Submarine-air cooperation* is widely practised in the Soviet navy but the idea has blown hot and cold by turns in NATO. It has particular value in a time of tension for establishing the location of potentially hostile units while recognising non-combatants.

35. The importance of *intelliqence-qathering* and *surveillance* can not be stressed too highly; and the operations involved provide excellent training for war.

36. *The insertion of agents, commandos or combat swimmers (SAS/SBS)* are tasks for which a submarine is ideally suited; but *Special Operations* (the euphemistic term) are best conducted by a small SSK or, even better, a midget submarine (see below): an SSN is wasted in confined waters and at undue risk.

37. Providing a "loyal opposition" for *training ASW forces* continues to be a needful and time-consuming job.

38. *Training submariners* (especially prospective commanding officers—"Perishers") is also time-consuming. It has constantly been demonstrated in war that success depends more on men than material; that the "Perisher" course is the finest training for COs anywhere; that the Royal Navy can thereby expect a higher proportion of "aces" than any other navy; and that the cost of a Perisher—perhaps more than 1 million for each officer—is cheap at the price.

39. A degree of ASW *support for SSBNs,* involving extensive and lengthy operations, is required to make sure the road is clear for them.

Submarine Bases.

40. Faslane, although said to be secure, is worryingly liable to be locked in by covert hostile action; but the vast investment there presumably demands that the base continues; and it should be able to accept another half-dozen running boats although extra housing for personnel alone could cost over 100 million. Devonport is quite good from operational aspects but less than ideal for personnel: if the size of the Squadron there were markedly increased the bill for extra shore facilities would be colossal. Gosport is a long way from deep water, remote from potential operating areas and can not accept nuclear submarines: it would be unduly expensive to move the Submarine School and a pity to waste the special "Upholder" maintenance facilities; but the arguments for a mere four-boat SSK Squadron there, even if double-crewed, are not strong. On the other hand, the continuation of HMS Dolphin for six running boats (ie a total of eight SSKs) is economically justifiable. (The Committee will have heard the case and judged, but see comments under Personnel and Numbers below.)

41. It should not be forgotten, if prolonged deployment becomes necessary, that RFAs or merchant vessels can speedily be converted to support ships.

Future threats

42. The Soviet submarine fleet is continuing its building programme despite the state of the economy—and ASW submarines are the best, often enough the only, vehicles for keeping an eye on the products. Our personnel and technical superiority will have to be maintained; and there can be no lessening of surveillance operations. Moreover, surveillance may well need to be extended beyond the USSR: by the turn of the century there will probably be some 44 navies with submarines—some of them a potential menace. Early warning of hostile moves is highly desirable wherever.

43. The Arctic is predictably an area of future conflict: the seabed riches will be exploited (especially if global warming makes them more accessible) and that begs the question of who they belong to. Only submarines can operate in the ice-covered Arctic Ocean. The Soviet Union and Canada hold the frontiers: it would be prudent for the UK to support Canadian air-independent submarine interests—but not a hugely expensive Canadian SSN force which would (personal opinion) end in tears.

Future warfare

44. It can be supposed that future warfare will, whenever possible, be covert and that hostile acts will aim to be unattributable—in order to achieve an objective without immediate blame and consequent escalation to massive weaponry. Economic warfare (which could include clandestine attacks on merchant shipping and sundry adventures in the Arctic) will predictably be preferred to all-out naval battles.

45. The extensive use of underwater weapon systems—submarines and mines ideally laid by submarines—is thereby implied. (Note the devastation caused—38 ships torpedoed—during the Spanish Civil War by two purportedly Spanish fascist but actually Italian fascist submarines against neutral Mediterranean traffic and pro-Republican Russian vessels.)

Diving depth

46. Fast submarines need a maximum safe diving depth of four or five hundred metres to cater for possible mishaps that take them deep inadvertently. It is often said that they need to go below one thousand metres (the diving depth of a Soviet "Alfa") to reach the deep sound channel but it is a great deal cheaper to lower some kind of sonar equipment on the end of a wire.

Hull construction

47. Toroidal construction and/or the use of plastic materials for hulls could be advantageous. New methods of construction require a paper to themselves: they deserve funds for research.

Communications

48. It is essential that submarines receive messages from shore at any depth at any time in any geographical position including the Arctic. Most submarines are quite well equipped for this although there are operational limitations on towed buoys and antennae. Needless to say, an antenna must not be visible from the surface.

49. Submarines must be able to send messages to shore and other units without revealing themselves visually or electronically. Most modern boats have reasonable facilities although there are restrictions on speed and depth which can inhibit tactics. There is room for improvement in this field; and reliable communications of this kind could be crucial in a tense situation.

Navigation

50. Ship Inertial Navigation System (SINS) is fitted in all nuclear-propelled submarines. The latest equipment is dependable but expensive. Small submarines in tricky navigational areas (eg inshore) could be satisfied by much cheaper and simpler Doppler navigation sets operating at a virtually undetectable 550-650 kHz but this is not at present fitted in the Royal Navy. Meanwhile, bottom-contour navigation is widely employed: so is the LORAN radio-fixing aid and satellite navigation (SATNAV) - but how long would a satellite last in a major war?

Sensors

51. Low frequency passive sonar (hull-mounted and, most efficient but speed-retarding, towed arrays) will continue to be needed together with computerised classification and fire-control equipment. However, in light of widespread quieting active sonar may have sometimes to be used in future. It gives the game away and sacrifices the stealth which submariners have been at such pains to acquire; but there is a cure for that.

52. Active transmissions could be made to sound like ambient noise: the hardware is not difficult to construct but the software - to adapt to the continually changing background - is another matter. The USN is focusing on research into concealed emissions.

Air Independent Propulsion (AIP)

53. Nuclear power needs no comment except to say that very small plants are now available (eg Canadian AMPS). Rolls Royce & Associates (RRA) have confirmed that it would have been feasible to fit a nuclear plant into a Type 2400—but the FOSM of the day said that he could not cope with any substantial additions to the nuclear fleet then planned.

54. There are three types of non-nuclear AIP available—the *Stirling engine* (Swedish, complicated, limited running without maintenance and a horrid problem for engineers but relatively quiet); *Fuel Cells* (quite good, fitted in Germany's *U-1,* widely researched, rather low power but a good deal of waste heat, not suitable for high burst speed except, possibly, in a new form devised by Canadian Ballard); and Italian *GST* (Gaseous Storage of energy in a Toroidal hull: very promising).

55. All three systems are being examined by VSEL, the Advance Projects Office and others in UK as well as abroad. The Soviet navy has probably adopted GST for at least one design.

56. GST seems the best albeit demonstrated only in a 29-ton midget craft styled "3 GST 9". It is wakeless (hence less detectable by non-acoustic ASW) because exhaust gases are stored in vacant toroids; shore infrastructure is minimal; training is simple—2 months for an engineer; and there is none of the ultimate disposal problem associated with nuclear submarines. Although naval architects incline to be agnostic, tentative calculations suggest that a 1000-ton GST SSK (no snorkel and no real need for batteries) could go for 1,200 miles at 25 knots or 30,000 miles at five knots fully submerged without exposure - which would make it a "Green Nuke".

Small submarines

57. There are arguments for a new generation of small AIP SSKs by, say, the year 2010:

a Small boats will be needed for shallow-water coastal operations where a future enemy will predictably conduct some important business—eg minelaying, insertion of agents, intelligence gathering.

b In open waters, with potentially hostile submarines becoming even more stealthy, ASW submarines will have to patrol a particular area in greater numbers.

c But, even with allies, there will not be enough ASW SSNs to solve the geographical problem entirely. SSKs will have to supplement them; and if a fair number is wanted they must be reasonably cheap—which means small.

58. For the usual reasons speed and endurance would be less than for large boats and fewer weapons could be carried. On the other hand the little hulls would be less detectable. Long-range deployment would not be possible at high speed but tactical speeds would be adequate—say 25 knots. If we do not go directly for GST AIP the first step could be a hybrid with Fuel Cells for patrol and a battery for burst speed. (Fuel Cells were being considered for later Type 2400s before the programme was cut short.)

59. Something around one thousand tons should be enough for an AIP SSK that will do most localised jobs: if not gold-plated the price-tag for two dozen should equate with (but not substitute for) five future SSNs. The standard weapon load would be markedly reduced from 25 weapons in a "Trafalgar" SSN (30 in projected "W'-class) or eighteen in an "Upholder SSK'. But if AIP SSKs are used primarily for ASW a total of four or maybe six weapons ought to be quite enough: there will not be many opportunities of engagement for any one boat.

6 . Extensive automation is needed for a small boat: not enough effort has been devoted to that in the Royal Navy although a Type 2400 "Upholder" has only 7 officers and 40 men (which compares with 67 in the crew of an "Oberon" SSK and 108 in a "Trafalgar" SSN). The Soviet submariners employ automation extensively but in an automated "Alfa" SSN the crew of 45 comprises virtually "all Chiefs and no Indians'.

61. Notwithstanding the arguments in favour of having some 1000-tonners (which FOSM may endorse) cries of pain at such a proposal are likely to raise the roofs in MOD London and MOD Bath.

Midget submarines

62. Midget submarines are proliferating and likely to cause mayhem in current and future hotspots. (A separate classified brief can be provided).

63. Midgets are emphatically not just scaled-down versions of standard boats and hence relatively ineffective tactical weapon systems. Normal submarine tactics are not their province: they are strategic in purpose and they strike at source. By definition they must be small enough - preferably around 40 tons - to penetrate defended ports and anchorages or slither around obstacles without being detected. Off-shore installations as well as important ships in harbour are prime targets. Some models can carry six or even ten combat swimmers/intruders.

64. Rather larger mini-SSK designs (between 135 and 150 tons which is beyond the true midget range) can take Mine Delivery or Swimmer Delivery Vehicles, permitting the SSKs themselves to stand off. (Only one navy - classified brief available - is believed to have such very small SSKs.)

65. Ground and/or limpet mines are a midget's normal load but, if a flock is despatched against a harbour, one or more can carry a battery of rockets (120mm, 25Km range) for attack and diversion. Some could also carry small anti-swimmer/anti-midget torpedoes internally or externally.

66. Midgets are usually either towed or carried piggy-back to the operational area by parent submarines with a connecting hatch (probably a standard DSRV fitting would do); but they can quite easily be transported in merchant ships (certain Soviet merchantmen have a moonpool) or even air-lifted - most can be dismantled into three sections.

67. The Royal Navy abandoned its X-craft unit in 1958: some say because FOSM was required to sacrifice four hulls and he naturally chose the midgets; but it is more likely that they were given up, with a sigh of relief, because they took wartime risks in peacetime. The Soviet Union has some 200 midgets (four types) and certain other navies have a small number. Two or three are sufficient for a raid to create havoc because harbour defences against tiny marauders have been almost wholly neglected over the past thirty years.

68. US Navy SEALs are anxious to acquire dry vehicles (ie proper midgets) instead of the wet Mark 8 "chariots" now in service: doubtless the SBS is equally keen on better transport. The United States Congress has appropriated $19 million ($15 million remaining) for the Italian 3 GST 9 - by far the most

advanced craft of its kind - but the SEALs seem worried by the thought of new technology (because they refuse to allow "proper" submariners to run their craft) and there is a Not Invented Here sign hanging on the door. They are therefore seeking an American build (despite the intentions of Congress and Senator Sam Nunn's Committee) which will be unexciting and slow in arriving: it would not be a good idea for the RN to follow this Transatlantic lead.

69. President Woodrow Wilson, speaking of German U-boats in 1917, remarked "I despair of hunting hornets all over the farm when I know where the nest is'. His words ring true today - hence these rather lengthy comments on midget submarine warfare.

Submarine Development Squadron

70. Trials, of any kind, are not best conducted in ordinary running submarines: the crews seldom understand fully what is required; there is inevitable overcrowding because of boffins, commercial representatives and observers; unreality creeps in; and there is a temptation to exaggerate success - by firms for the obvious reason and by submariners to be quickly rid of trial equipment and get on with normal operations.

71. There is much to be said for developing, testing and evaluating weaponry and tactics in an independent Submarine Development Squadron like the US Navy's SUBDEVRON 2 at New London. It would best be formed by six boats drawn from European navies (one SSN and one SSK from the RN). Not only does 1992 beckon but there is little sense, and much nugatory cost, in each European navy continuing to go its own way - although FOSM takes the opposite view and wants to retain his privacy. The Squadron should be based close to deep-water areas.

72. It could be advantageous to invite a (future) Canadian boat to join the Squadron periodically.

Personnel

73. The Submarine Service has not been all-volunteer for a long time, at least not since the beginning of World War II. Nevertheless men usually become volunteers after a year or so in a boat.

74. Morale at sea is excellent: spirit and professionalism are as high as ever; and the quality of men, especially in the nuclear fleet, is exceptional - as it certainly must be.

75. However, the rate at which officers and men leave the service after a few years (usually when approaching the age of thirty) poses a serious problem.

76. Pay is an obvious reason. But, evidenced by many a heartfelt whinge, it is clear that there are other causes of premature departure.

77. Foremost is the inability to predict, with reasonable confidence for families, when a submarine will be in its home port. SSBN crews do not have this problem: their diaries can be trusted and that makes everyone happy. It is the SSNs and SSKs - the former mainly - that suffer from frequently changing schedules: these are operationally necessary no doubt, but bad news all the same. One solution is for FOSM to say a flat "no" to unplanned commitments; but that flies in the face of submarine tradition and would scarcely strengthen bonds with the Ministry of Defence. The "fifth watch" system for SSNs (enlarging a "Trafalgar" crew from 110 to about 125) helps by allowing a proportion of the crew to spend some of their time augmenting the maintenance unit ashore; but it is not having enough sea-going submarines that is at the heart of the matter. Of course, recent nuclear-plant problems have compounded the problem.

78. A two-crew system has been suggested for "Upholder'-class SSKs. There would theoretically be no increase in manpower because the off-duty crew would substitute for the maintenance unit at the base; but (personal opinion based on long experience of base and depot-ship maintenance as well as the nature of SSK useage) its practicality is dubious; and it is equally doubtful whether personnel would be happier because tasks could not be equally shared as they are in SSBNs. The proposal arose from the threatened reduction of "Upholder" hulls to four and it sounds suspiciously like *faute de mieux*. (See para 90 below.)

79. Unhappiness also stems from under-resourcing ashore which is said to be a prime reason for leaving - sub-standard accommodation, dismal surroundings (eg Devonport Dockyard), inadequate car-parking spaces, not enough recreation facilities and so on.

80. At the same time, the high cost of necessarily living in naval accommodation ashore when in harbour (not applicable to surface ships) is a real concern.

81. Lack of job satisfaction has been cited by one senior staff officer but does not appear to be a widespread complaint - nor should it be.

82. Discomfort at sea is seldom resented although there are ten bunks too few for the standard crew in a "Trafalgar" SSN and twenty-seven too few when the normal number of trainees and "riders" are embarked - as they invariably are - bringing the total onboard to about 125. It is not uncommon for 40% of ratings to "hot bunk'.

83. If legitimate reasons for dissatisfaction are not answered there will be a serious shortfall of submarine personnel. (That is evident not only by staff concerns but also by long personal knowledge of officers and men, at all levels, who talk uninhibitedly to a "non-aligned" listener.)

Numbers

84. *SSNs* will be essential for the foreseeable future: only they can deploy rapidly to distant areas and, with heavy firepower, enjoy unfettered mobility on patrol.

85. The number could depend upon a forecast of the future threat; but, at any one time in peace, four will always be needed at home for pro- and anti-submarine training, road-sweeping for SSBNs and unexpected defence requirements (eg the Falklands). A further two must be earmarked for intelligence-gathering and under-ice work (special fit required for both); one for the proposed Development Squadron (or, if not formed, for trials and evaluations); and three for AUTEC, major exercises, augmenting surveillance and (important for morale and hence recruitment/retention) jollies to foreign ports. None of these commitments is significantly lessened either by reason of winning the Cold War or by the smaller number of ships predicted for the surface navy.

86. Allowing for refits, dockings, maintenance, adequate time in home ports and leave, a total of fifteen SSN hulls is implied. That number can be reduced by a couple if, as intended, refits are in due course extended to ten-year intervals.

87. Two crews for each running SSN would theoretically reduce hull numbers by 30 per cent, but the men would be hard to find and disproportionately expensive to keep. Nor would there be enough hulls for a sudden "surge': even the fastest SSN can not be in two places at once. The compromise of a "Fifth Watch" is cheaper and operationally better. (Agreed, the French, with less commitments, employ two crews successfully; but they currently have only three SSNs at sea and the arithmetic makes more sense for such a small number.)

88. There is another way of playing the SSN numbers game. VSEL can not continue a nuclear building programme with less than one order about every eighteen months; and it would be virtually impossible to disband and then reemploy the nuclear building team if the programme was halted and recommenced at a later date. Assuming that the life of an SSN is twenty years (elastic) a fleet of thirteen SSNs results from holding together the building capability at Barrow; and that happens to match the future minimum requirement in peace or war.

89. *SSKs* are less liable to be deployed urgently although they certainly feature strongly in war and contingency plans. Eight one-crew SSKs (total including those refitting etc) are required for defence in localised areas, for ASW services, for (relatively limited) intelligence-gathering, for inshore shallow-water operations (becoming more and more important), minelaying, SAS/SBS insertion, for going to places where the Green Party will not admit "Nukes" and for basic training, noting that it is inadvisable to put learners in a Mercedes - much better that they start in a Morris Minor.

90. Two crews for each running SSK would result in 30 per cent more hull-useage; but, as in SSNs, manpower (including shore facilities) absorbs considerably more money than material maintenance and amortised building costs over a submarine's lifetime. And again there would not be enough hulls for a warlike emergency if a two-crew system were allowed to reduce the number from eight.

91. The building programme for SSKs (any kind) is not as critical as it is for SSNs: it can be restarted after a grief-filled pause if necessary. Nevertheless, Cammell Lairds - now up for sale in wake of the cutback in orders for "Upholders" - would be mightily relieved if a decision can be made quickly to restore the four "Upholders" cancelled by proposed Options for Change.

92. It would not help to seek a cheaper design to replace these four "Upholders': expensive though the class is, it would cost a lot more - and result in interminable delays - to produce something different for the current generation. The next generation is another matter; and it should be contemplated now.

93. The Committee might wish to see what submarine numbers have been from 1901 to the present day: they are listed at Annex D.

94. In summary, the Royal Navy needs thirteen SSNs for the future (about two-thirds of them over-complemented by fifteen per cent) and eight one-crew SSKs.

ANNEX A

No Occupation for a Gentleman?

The Royal Navy's first "submarine boat" *Holland I* was launched on 2 October 1901. Opinions then, and for years thereafter, were that submarining was "no occupation for a gentleman"; that submariners looked like "unwashed chauffeurs"; that submarine crews captured in wartime "should be hanged as pirates"; and that submarines themselves were "the weapons of a weaker power".

Until 1905, when Fort Blockhouse became a base, the little boats were relegated to the upper reaches of Fareham Creek along with prison hulks, powder vessels, quarantine ships and other undesirables.

Understandably, submariners (calling themselves "The Trade" at a time when trade was anathema to the ruling classes) withdrew into their steel shells. Here, they banded together in an elite, unparalleled society of professionals; but, both figuratively and literally, their elegant contemporaries continued to look down upon them from spotless quarterdecks. Admiral Jacky Fisher was one of their very few protagonists at the start; but, unfortunately, his prophesy that "My beloved submarines are not only going to make it damned hot for the enemy . . . but they are going to bring the income tax down to threepence in the pound" only proved right in the first respect.

The consequences of forming what was virtually a private navy were profound and long-lasting. Communication with the Admiralty was tenuous; there was - is - no submarine representation on the Board (although, by contrast, the Fleet Air Arm was eventually represented by the Fifth Sea Lord); and the admirals did not understand what submarines could or could not do. Misemployment, less than ideal equipment and inadequate weapons were bound to follow.

To an extent the effects of a chip on early submariners" shoulders are evident today. The underwater service has very strong points in its favour; but they include neither good PR nor a notably close relationship with the Navy Board despite numerous submariners at Head Office. Granted, submarine warfare is secretive by nature; but it could be better understood outside the Submarine Service without security being breached.

ANNEX B

The following, probably familiar to the Committee, is part of a speech by Dmitry Manuilskiy to the Lenin School for Political Warfare, Moscow in 1931. Allowing that his time-scale was wrong, it is not impossible that his prophecy has begun to be fulfilled:

> "War to the hilt between communism and capitalism is inevitable. Today, of course, we are not strong enough to attack. our time will come in twenty or thirty years. To win, we shall need the element of surprise. The bourgeoisie will have to be put to sleep. So we shall begin by launching the most spectacular peace movement on record. There will be electrifying overtures and unheard of concessions. The capitalist countries, stupid and decadent, will rejoice in their own destruction. They will leap at another chance to be friends. As soon as their guard is down, we shall smash them with our clenched fist."

ANNEX C

COMPARATIVE ATTACK-TYPE SUBMARINE WEAPONS

(All figures are nominal, maximum—take with a pinch of salt in some cases)

BRITISH	AMERICAN	SOVIET	FRENCH	ITALIAN
Torpedoes				
Tigerfish Mod 2 21-inch; dual purpose wire-guided; active/passive homing; 13km at 35 kts active, 29km at 24kts passive; warhead 134kg	*Mark 48* 21-inch; dual purpose active/passive homing to 50km/38km or 40km/55kts. (ADCAP version= advanced capability esp unde ice) depth 900m; warhead 267kg	*Type 53* 21-inch; dual purpose; pattern active/passive homing to 20km at up to 45kts; warhead 400kg or low-yield nuclear	*L5* 21-inch; dual purpose; active/passive homing to 17km at 35kts; depth 550m; warhead 150kg free swimming	*A184* 21-inch; dual purpose; wire-guided; active/passive homing to 25km at 24kts or 17km at 38kts; warhead 250kg. (swimout discharge)
Spearfish 21-inch; wire-guided; active/passive homing to 65kms at 60kts; directed energy warhead (coming into service)		*Type 65* 25.6-inch; anti-surface; pattern active/passive wake homing to 50km; warhead 900kg or low-yield nuclear	*F17* 21-inch; dual purpose??; wire-guided; active/passive homing to 20km at 40kts; depth 600m; warhead 250kg	
BRITISH	**AMERICAN**	**SOVIET**	**FRENCH**	**ITALIAN**
Missiles				
Sub-Harpoon Anti-ship; 70nm (128km); sea-skimming; active radar homing; warhead 258kg	*Sea Lance* Carries a Mark 50 ASW torpedo: project may be in abeyance.	*SLCM SS-N-21* 21-inch; land-attack; inertial/terrain following to 3,000km; warhead nuclear 200kt CEP 150m	*Exocet* 21-inch; inertial cruise; active radar homing to 50km (27nm); warhead 165kg	*Sub-Harpoon* A future possibility
	Tomahawk SLCM; 1,400nm (2,500km) nuclear land-attack; 485nm (900km) conventional land-attack; 250nm (460km) ship-attack	*SS-N-15* 21-inch; ASW; inertial to 37km; warhead nuclear 200kt		
	Harpoon Anti-ship; 70nm (128km)	*SS-N-16* 25.6-inch; ASW inertial to 92km; carries ASW torpedo Type 45 (warhead 100kg) or nuclear payload		
		SS-N-19 "Oscar" SSGN; anti-ship; 445km (240nm); warhead 750kg HE or nuclear		

ANNEX D

SUBMARINE TONNAGE AND NUMBERS 1901–1990

(Note: ordering preceded completion by one or two years for early boats but longer as design progressed)

Completion year	Total numbers (net)	Total Tonnage (SSNBs exempt)
1902	2	244
1903	6	
1904	11	
1905	22	
1906	32	
1907	40	
1908	49	
1909	60	
1910	65	
1911	70	
1912	73	
1913	72	
1914	79	35,705
1915	118	
1916	128	
1917	151	
1918	156	135,998
1919	138	
1920	110	
1921	91	
1922	65	
1923	64	
1924	62	
1925	61	64,492
1926	60	
1927	60	
1928	60	
1929	63	
1930	57	
1931	51	
1932	44	
1933	44	
1934	49	
1935	47	
1936	51	
1937	55	
1938	63	
1939	65	95,263
1940	61	
1941	77	
1942	92	
1943	117	
1944	130	145,680
1945	142	
1946	106	
1947	91	
1948	90	
1949	79	
1950	61	
1951	47	
1952	44	
1953	44	
1954	44	
1955	43	
1956	47	56,400
1957	56	
1958	57	
1959	59	
1960	59	
1961	55	

SUBMARINE TONNAGE AND NUMBERS 1901–1990—Continued

Completion year	Total numbers (net)	Total Tonnage (SSNBs exempt)
1962	55	
1963	50 + 1 SSN = 51	
1964	49 + 1 SSN = 50	
1965	42 + 1 SSN = 43	
1966	42 + 2 SSN = 44	
1967	43 + 3 SSN = 46 (+ 1 SSBN)	
1968	41 + 3 SSN = 44 (+3 SSBN)	
1969	35 + 3 SSN = 38 (+ 4 SSBN)	
1970	32 + 4 SSN = 36 (+ 4 SSBN)	
1971	25 + 6 SSN = 31 (+ 4 SSBN)	
1972	25 + 6 SSN = 31 (+ 4 SSBN)	
1973	23 + 7 SSN = 30 (+ 4 SSBN)	
1974	22 + 8 SSN = 30 (+ 4 SSBN)	93,020
1975	22 + 8 SSN = 30 (+ 4 SSBN)	
1976	19 + 9 SSN = 28 (+ 4 SSBN)	
1977	17 + 9 SSN = 26 (+ 4 SSBN)	
1978	16 + 10 SSN = 26 (+ 4 SSBN)	
1979	16 + 11 SSN = 27 (+ 4 SSBN)	
1980	16 + 11 SSN = 27 (+ 4 SSBN)	
1981	16 + 12 SSN = 28 (+ 4 SSBN)	
1982	16 + 12 SSN = 28 (+ 4 SSBN)	
1983	15 + 12 SSN = 27 (+ 4 SSBN)	
1984	15 + 12 SSN = 27 (+ 4 SSBN)	
1985	15 + 13 SSN = 28 (+ 4 SSBN)	101,150
1986	15 + 14 SSN = 29 (+ 4 SSBN)	
1987	13 + 15 SSN = 28 (+ 4 SSBN)	
1988	11 + 15 SSN = 26 (+ 4 SSBN)	
1989	12 + 16 SSN = 28 (+ 4 SSBN)	108,920
1990	11 + 17 SSN = 28 (+ 4 SSBN)	

13. Memorandum submitted by VSEL (15.4.91)

Introduction

This short paper

a. Provides an outline of the history of the SSN20 Project from the 1970s to the middle of 1990.

b. Identifies VSEL's Private Venture Future SSN (FSSN) activities from the middle of 1990 to the end of March 1991.

c. Discusses a number of factors which VSEL believe must be taken into account when deliberating the future procurement strategy for submarines.

The History of the SSN20 project

1. Consideration was first given to thhe Future Generation Submarine (FGS) during the 1970s.

2. In May 1979, the then Operational Requirements Committee (ORC) endorsed the Naval Staff Targets for the Follow On SSN (FOSSN) Sonar, Action Information Organisation and Fire Control System (SAFS) (NST 7765) and Weapon Handling and Discharge System (WHDS) (NST 7524).

3. By September 1980, the NST for the FOSSN itself (now referred to as SSNOZ—the SWIFTSURE Class having been termed the SSNOX Class and the TRAFALGAR Class the SSNOY Class) was placed in abeyance, whilst the attention of the MoD and of Industry was directed to the procurement of the Type 2400 SSKs (the UPHOLDER Class) and the TRIDENT SSBNs (the VANGUARD Class).

4. SSNOZ was revived as SSN20, for which the Outline Staff Target was issued in July 1985 and the Staff Target (Sea) (ST(S) 7027) was issued in March 1986, stipulating a Programmed Acceptance Date (PAD) of the First of Class (FOC) of October 1998—which date was determined by consideration of the predicted threats, of the submarine capabilities and force levels necessary to combat the threats and of the VSEL Barrow design and build capacities and loadings.

5. VSEL was awarded the SSN20 Design Assistance Contract (DAC) in October 1986 and, in response, put in place the VSEL Prime Contract Management Office (PCMO) in order to manage the work of the DAC, to respond to the Invitation To Tender (ITT) for the Project Definition (PD) Phase and to prepare to manage the PD and subsequent Phases of the SSN20 Project.

6. It had been the intention that the SSN20 Staff Requirement (Sea) (SR(S) 7027) would be issued late in 1987 or early in 1988; in the event the approval of SR(S) 7027 by the Equipment Projects Committee (EPC) was not achieved until August 1989, at which time the PAD was stipulated to be April 2000.

7. VSEL had submitted the priced Tender for the PD Phase of thhe SSN20 Project in May 1989; subsequent to the EPC approval of the SR(S) there were a number of amendments to the ITT, to which VSEL responded by preparing a revised Tender.

8. During the Autumn of 1989 further considerations of the affordability of the SSN20 Project and of the overally procurement strategy resulted

a. in VSEL's proposal for a VSEL-led Coordinating Contractors Management Organisation (CCMO) in which British Aerospace plc (BAe), General Electric Company plc (GEC), and Rolls Royce plc (RR)—and other appropriate companies—would fill a significant number of posts.

b. and in the Controller of the Navy's request on 19 December 1989 for the formation of a BAe/GEC/RR/VSEL Joint Venture Company (JVC) to manage the PD Phase of the SSN20 Project, in order to enable an effective competition to take place, from which would be selected the Prime Contractor for the Full Development (FD) and Build Phases.

9. VSEL and the other companies immediately seconded key staff to the JVC, which was registered as Underwater Management Associates Limited (UMA), based at the VSEL Office in Bath. A revised ITT for the PD Phase was received from MoD(PE) in February 1990. A draft Response was submitted late in March 1990, the priced Response was submitted early in April 1990 and clarification of points of detail was completed early in May 1990.

10. The Controller of the Navy's letter had envisaged the placing of the contract for the PD Phase at the end of March 1990. The contract not being forthcoming and the way ahead becoming more and more unclear as a result of "Options for Change", the parent companies placed the activities of UMA in abeyance late in June 1990. VSEL undertook to keep their office in Bath in being in order to provide a focus for the MoD. This office has contined to play a very active part in the MoD-Industry discussions.

11. It is understood that during the Autumn of 1990 MoD(PE) initiated a submission for approval to proceed with a "Pre-PD Studies" contract to review the predicted threats, to identify the capabilities necessary to combat those threats and to predict the costs of providing those capabilities.

12. It is also understood that during the Spring of 1991 the MoD(PE) initiated a submission for approval to proceed with a PD Phase contract to define a "Follow On TRAFALGAR" design which would have adequate performance and availability at an affordable price.

13. It is understood that neither of these submissions has yet received approval by Ministers.

VSEL's Private Venture future SSN activities

VSEL Future SSN Options Study

14. During the Autumn of 1990, VSEL carried out, as a Private Venture, an independent Study to identify possible Future SSN (FSSN) options.

15. This Study was made possible by VSEL's in-depth knowledge of all the elements of a complete submarine design (Platform, Nuclear Steam Raising Plant, Propulsion Plant and Combat System).

16. The Study required the development of a method of assessing the benefits provided by a number of viable designs and of estimating the cost of each design, thus enabling a cost/benefit analysis of possible SSN options.

17. The conclusions of the Study were that options did exist that offered not only reduced costs and risks but also comparable performance, to the SSN20 requirements that had been approved by the EPC in 1989.

18. The Study results were presented to MoD(PE) representatives, and others, during the Winter of 1990 and the Spring of 1991.

19. Diagrams 1 to 10 attached to this paper illustrate a number of the aspects of the Study.

VSEL Future SSN Pre-PD Phase Proposal

20. Using the comprehensive understanding of the myriad activities necessary to progress an SSN Project, gained by virtue of VSEL's long involvement with nuclear submarine projects, the experience gained from VSEL PCMO from 1986 to 1989, VSEL's participation in UMA for the first half of 1990 and the VSEL FSSN Options Study during the second half of 1990, an unsolicited Proposal for a VSEL-managed FSSN Pre-PD Phase was prepared and submitted it to MoD(PE) on 26 March 1991.

21. This Proposal, which is for a six month period of work and is fully priced, programmed and resourced, has as its objective the effective, rapid, start to the PD Phase of a FSSN Project. It is specifically intended to keep open all viable procurement strategies for the PD and subsequent Phases and it includes, from the start, significant contributions from appropriate companies. It would be possible to evolve at any time from the proposed contract to the selected management arrangements for the PD Phase.

Factors to be taken into account

22. It is considered to be imperative that the United Kingdom retains the capability to design, to build and to support through life highly effective yet affordable SSNs and SSKs.

23. In order to maintain the future submarine force levels envisaged by the Secretary of State for Defence in his statement to the House of Commons on 25 July 1990 the next SSN to be built after the presently-completing SSN19 would require to become operational in the early 2000s.

24. A precis of VSEL's strategic review completed in March 1991, which has been widely presented within the Ministry of Defence is attached as Appendix 1. It indicates that, if the plan is to succeed, the company must maintain at its core a minimal level of business for the Royal Navy which would make adequate use of the facilities and resources which have been established there for Ministry of Defence programmes.

That core involves:

a. The continuation of design and construction of submarines for the Royal Navy.

b. the design and construction of surface ships for the Royal Navy, and

c. the refit, initially of submarines, but later of a wider variety of naval vessels.

It is envisaged that this viable core would employ approximately 5,000 people and, once established, would provide the basis from which the company could extend its activities into defence land systems and the specific commercial and industrial engineering activities it has identified as potential markets.

25. Within the working community of Barrow-in-Furness, there is only one signficant industrial enterprise, VSEL, which directly employs a number equivalent to over half the working population of the town. In such a small community, where 1000 people represents between 4% and 5% of the working population, it is essential for the well-being of the community that a substantial number of employees are retained by VSEL. If the company succeeds in its objectives, it expects to employ between 7,000 and 9,000 people by 1995, compared with an average of 14,000 over the last 25 years. Of the 7,000–9,000, 5,000 must be engaged in the supply of products and services to the Royal Navy.

14. Memorandum submitted during a briefing given by Rolls-Royce and Associates Ltd. (18.4.91)

ROLLS-ROYCE AND ASSOCIATES LIMITED

Introduction

Rolls-Royce and Associates Limitcd is:—

(a) The delegated design authority for the nuclear steam raising plants of the Naval Nuclear Propulsion Programme.

(b) The nominated supplier for all the equipments which comprise the nuclear steam raising plant.

(c) The operator, under contract of the VULCAN Naval Reactor Test Establishment at Dounreay in Scotland.

The Company's position is defined by a Memorandum of Understanding between the Navy Department of the Ministry of Defence and Rolls-Royce and Associates Limited, signed in 1965. A principal clause of the MOU states that "It is the Department's design that the Company shall be seen to stand in a special relationship with the Naval Department of the Ministry of Defence".

History

In 1954 a Naval Section was formally established at the Atomic Energy Research Establishment, Harwell, to conduct research and development for the design of a pressurised water reactor for submarines. Rolls-Royce Limited seconded staff to this section and, by 1957, were part of a Contractors Team based at Rolls-Royce which was to be the focus of design and procurement work for the reactor plant used at the original Dounreay Submarine Prototype.

* * *

Rolls-Royce thereafter acted as the appointed UK agents in all further negotiations—although the Admiralty and the AEA representatives were often present. The Company also constructed, at its own expense, a highly-specialised reactor core manufacturing facility in Derby—Rolls-Royce Nuclear Department.

Rolls-Royce and Associates was therefore formed in 1959 as a Limited company to manage * * *, exercise technical control and undertake design and procurement of Nuclear Steam Raising Plant. including that for the Dounreay Submarine Prototype. Fifty-two per cent of the holdings were owned by Rolls-Royce, twenty-four per cent by Vickers and twenty-four per cent by Foster Wheeler.

The US Connection

* * *

Memorandum of Understanding

* * *

Provision

* * *

Non-Naval Work

* * *

However, in 1982 it was agreed that subject to certain conditions * * * RRA could undertake non-naval work. * * * Since 1982, RRA has worked for AWE, CEGB (now Nuclear Electric) and more recently for non-nuclear areas of industry. To minimise conflicts of interest among RRA shareholders Rolls-Royce plc has been offered or acquired the remaining forty-eight per cent of the shareholding and, in 1989, RRA became wholly owned by Rolls-Royce plc.

Contractual Agreements

Contracts for equipments and services are received from Director of Contracts—Weapons, Director General of Supplies and Transport (Nuclear), Chief Executive—Dockyards, VSEL and YARD Limited. Special contractual conditions for nuclear steam raising plant are specified in detail by Director of Contracts (Submarine and Nuclear). Technical accountability is direct to Director General Submarines (Director of Nuclear Propulsion) for all contracts including those placed by VSEL. Following discussions

between MoD and RRA in 1985/86, it was agreed that the amount of annual fee payable should be dependent (to an extent) upon the achievement of specific objectives or targest—"milestones". The aim of these new arrangements was to promote increased effectiveness and efficiency, improved cost forecasting and monitoring and reductions in sub-contracted expenditure. It has proved to be a very successful basis upon which to operate.

During 1990 RRA and MoD concluded arrangements for the pricing of non-competitive risk price contracts in support of the Naval Nuclear Propulsion Programme. The aim is, wherever practical, to negotiate risk prices for contracts normally subject to Fee-based Ascertained Cost pricing arrangements. This will further improve value for money for MoD and afford RRA the incentive and opportunity to gain higher rewards for:

(a) even greater efficiency, and

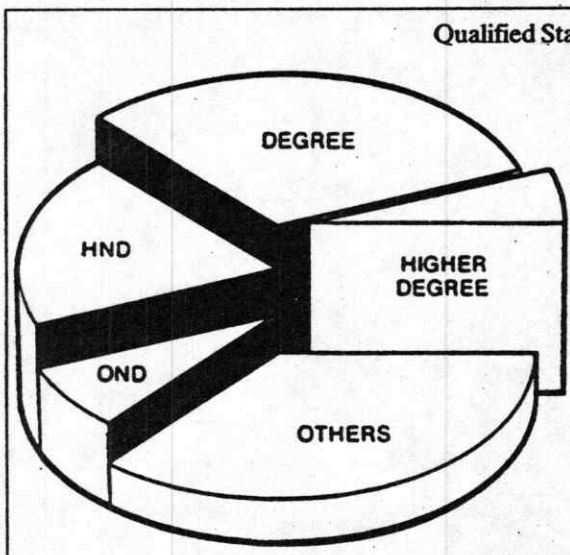
(b) accepting certain risks hitherto borne by MoD.

As part of this process of transferring more risk and reward to RRA, agreement has also been reached to place less dependency on the Indemnity arrangements traditionally provided by MoD to RRA.

RRA's technology base

Rolls-Royce and Associates employs 1,850 people, more than 400 of whom are based at the Naval Reactor Test Establishment in Dounreay. All are security-cleared to work on Ministry of Defence contracts and sixty per cent possess recognised professional qualifications.

These qualifications cover a very broad area of scientific and engineering disciplines and thus emphasise the wide-ranging responsibilities of the Company. However the large proportion of staff with qualifications in physics, electrical and electronic engineering and mechanical engineering emphasises RRA's real strength.



Qualified Staff Disciplines

Physics	143
Mathematics	28
Computing	42
Materials	34
Other Sciences	70
Electrical/Electronic Engineering	243
Mechanical Engineering	422
Chemical Engineering	32
Production Engineering	15
Nuclear Engineering	17
Other Engineering/Craft	77
Business Management	34
Arts/Languages/Other	19
	1176

Figure 2

It also indicates that, within the Company, there is considerable specialist flexibility which can be made available when required. Many members of staff have worked with the Company for a number of years and possess invaluable experience of the product. This experience can prove particularly important when providing in-service support for four classes of submarines constructed over a period of almost 30 years.

RRA is divided into five major divisions: the VULCAN Naval Reactor Test Establishment, Commercial, Projects, Operations and Finance; which are further sub-divided into 17 departments.

It is involved in the nuclear submarine programme from the concept stage, throughout the design and development phases, during construction and commissioning, then for the entire service life. The Company's expertise is still required during decommissioning—at which stage, post-operational inspections provide information for a comprehensive database used during the design of future submarines. Through its Resident Engineers at shipyards and dockyards, the Company ensures that any in-service maintenance of the plant is speedily carried out and that refuelling operations proceed safely and to schedule. It also maintains meticulous operating histories of each installation in order to predict, and therefore avoid, any potential problems as well as provide yet more information for future designs.

Nuclear safety

The responsibility for the safe design and operation of naval NSRP is vested in the MoD. In turn the responsibility for the design and supply of a safe plant is delegated to RRA who justify the safety of the design and provide documentary evidence in support. RRA also have a continuing role in providing the MoD with technical support and advice on safety matters to ensure safety in-service. The Safety and Reliability Directorate of the AEA (SRD) are retained by the MoD as independent assessors and advisors.

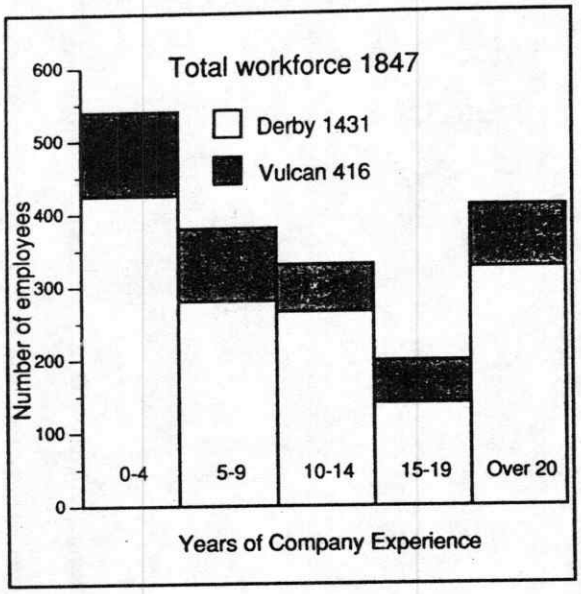


Figure 5

The safety justification performed by RRA demonstrates that under normal, abnormal, and certain failure conditions the NSRP design gives an acceptable level of protection to the submarine and plant and ensures that the risks to the public, repair/refit personnel and crew are minimal.

Throughout the life of the plant the safety justification may need to be reconsidered, for example, because of commissioning and operating experiences, developments in safety and methods of analysis, or changes in the scope of the original justification ie extended lifetime. In addition, each plant is revalidated at refit.

A major proportion of RRA's efforts are safety related and all the departments involved are consistently aiming for optimum standards.

Special Facilities

1. Vulcan

The PWR2 Shore Test Facility

The PWR2 Shore Test Facility is a section of a nuclear submarine hull containing the nuclear steam raising plant for the Vanguard Class Submarines, together with dump steam condensers, turbo generators and all power electrical equipment. The plant is fitted with extensive additional instrumentation and a computer controlled data logger to meet the following objectives:

(a) To prove the endurance, reliability and safety of the nuclear propulsion plant for the Trident Submarines before they put to sea and to resolve any problems.

(b) To prove and refine the computer models used to design the plant so that improved performance can be designed into the next class.

To prove and refine operating procedures for the plant.

(d) To test new items of equipment designed for the fleet under operational conditions.

The Loss of Coolant Accident Investigation Rig—Dounreay (LAIRD)

The Loss of Coolant Accident Investigation Rig—Dounreay (LAIRD) is the stern section of a Valiant Class Submarine complete with Nuclear reactor, steam propulsion turbines, turbo generators and all power electrical equipment. This plant was originally used to test the plant for Valiant, Swiftsure and Trafalgar Class Submarines and later defuelled, decontaminated and converted to a loss of coolant accident rig. The nuclear core has now been replaced by a four Mega Watt heater and facilities are installed to initiate leaks of varying sizes and from various parts of the plant. Leaks similar to that of Three Mile Island have been initiated, as has a total sudden failure of main coolant pipework. In all cases it was shown that the protective systems prevented core damage. This is the only full scale facility of this type in the World.

2. Raynesway Engineering Laboratory

The Raynesway Engineering Laboratory houses many rigs and facilities to support the development of nuclear steam raising plant and associated systems. Most have computer based data logging and control facilities, for example:

(a) The Valve Test Facility

This rig is used for development and production testing of most types of valves used in the reactor plant.

(b) Control Rod Drive Mechanism Test Facility

The facility is provided to perform production testing of control rod drive mechanisms at reactor temperature, pressure and water chemistry conditions. Certain component parts of the CRDM are calibrated prior to installation and test of a complete mechanism.

(c) Harsh Environment Test Facility

The HETF is an environmental test chamber in which samples of equipment (instruments, cables, filters, insulators etc) may be subjected to severe temperature, pressure, chemistry and humidity conditions, representative of those likely to be encountered following plant accidents.

(d) High Pressure Decay Heat Removal Rig

The HPDHR rig allows tests to be conducted to confirm performance of systems for heat removal following plant shutdown.

(e) Environmental Test Facilities

A series of facilities allow materials testing for fatigue crack growth, corrosion and stress corrosion whilst varying the water chemistry and other conditions.

3. Zero Energy Research Reactor

NEPTUNE is a zero energy reactor which can be dismantled and assembled at will into a range of different reactor cores. It has a low operating power (less than 100 watts) and is purpose-designed for research into naval PWRs. It was shutdown in early 1987.

4. Radioactive Components Facility

This facility allows decontamination and research and development work on radioactive components to be carried out under controlled conditions.

Sub-Contractor Base

The NSRP and all support equipment is provided by RRA, who procure all components and sub-assemblies. RRA then supplies them to the shipbuilder and oversees their assembly into the submarine. Additionally, all spares, modifications and updates are procured through the Company.

This procurement agency role is placed with RRA to ensure that the nuclear safety aspects contained within the design intent statements are faithfully maintained. RRA carries out this agency role in a manner which reflects the procurement policies of MoD(PE).

Over the past 30 years, a core of about 20 suppliers has been developed, with whom RRA work very closely. The major members of this group, RR plc, Vickers, Babcock and Foster Wheeler were, for many years, shareholders in RRA. More recently the campaign to extend supply by competition has increased the number of suppliers to 300. These are all regularly assessed and reviewed for all aspects of quality at 3 monthly intervals.

It has been normal practice to involve UK Companies in the manufacture of finished components to minimise communication and security expenses. This is becoming more difficult as the nuclear industry shrinks with the reduced national nuclear programme. RRA are now having to extend their procurement role into Europe to form new links and an understanding of the wider environment.

Nuclear Components Division (NCD)

Rolls-Royce Nuclear Department (RR-ND) was formed in 1959 to manufacture fuel elements and cores, it became RR Nuclear Components Division in the mid 80s and is shortly to be amalgamated into RRA as the Manufacturing Division.

* * *

The site is classified as a Grade 2 secure site which allows operation with up to 5kg of unalloyed uranium. It is also licensed by the Nuclear Installations Inspectorate.

In addition to the manufacture of fuel elements and cores, there is a steel manufacturing facility on-site which produces reactor supporting steelwork, reactor control rod drive mechanisms and a wide range of primary circuit valves. All items are produced to exacting standards, particularly regarding in-service reliability, shock performance and space considerations.

There are approximately 470 people employed at NCD. Half of them are involved in machining, fitting, welding, processing and inspection, whilst the remainder are professional staff involved in defining the manufacturing and processing operations, providing laboratory and health and safety cover and other support.

Following Options for Change the business has reduced by 30% and personnel levels are changing to reflect this. However, efforts are continuing to identify new business opportunities which would utilise the manufacturing skills at NCD, whilst recognising the high security restrictions which apply to this unique facility.

From 24th March 1991 steps are being taken to incorporate this business into RRA as the Manufacturing Division.

Company Future Workload

* * *

In 1982 it became possible for RRA to undertake work for Non-Naval customers, both civil and in other Defence programmes. This was vital as it had become obvious that the Nuclear Submarine Programme would not, in the future, be able to support the level of technical staff which existed at that time in RRA. However, it was important to maintain availability of this resource to the Programme and this could only be done by supplementing existing business from other sources.

The predicted downturn in the Nuclear Submarine Programme has not been as severe as was expected, and therefore the present level of supplementary business is just greater than 5% of RRA's turnover. With Options for Change and restraints forecast for MoD spending, it is apparent that this percentage must grow significantly over the next decade if the growth objectives set by the RRA Board are to be met.

RRA have naturally targeted the nuclear power generation business, particularly in the UK, nuclear reprocessing, and areas where safety is of significance, ie conventional power generation, oil, gas, transport and water. Skills which have offered so much to the Nuclear Submarine Programme are also being extended to other Defence programmes, such as other areas in the Submarine, the Surface Ship Programme, Naval base facilities and areas of both the Army and the Airforce.

RRA's strengths lie in the area of high integrity engineering systems—both mechanical and electrical, and in the proven ability to complete major turnkey contracts to time and to budget.

15. Letter from the Assistant Managing Director, GEC-Marconi, to the Clerk of the Committee (25.4.91)

SUBMARINE PROCUREMENT

You invited comment on the Committee's enquiry into the procurement of Royal Navy Submarines in the light of the "Options for Change" proposals announced in July and we offer our observations below.

1. The complexity of submarines and their equipment means that the necessary technical capability to design, produce and provide through life support is a substantial industrial undertaking.

2. To support the technology base necessary to maintain platform performance levels, and to keep pace with the enhancing capability of the future threat, requires considerable investment and a long-term view.

3. Operational experience is a major factor in evaluating the effectiveness of existing systems and provides a basis for determining future equipment specifications.

4. These three points argue strongly for a planned approach to the procurement of this key asset in order to provide the essential continuity for avoiding the degradation of expertise below the threshold of viability.

5. If the UK is to achieve reasonable deals from its intended international collaboration it needs to approach these ventures with some bargaining power. A substantial reduction of indigenous capability resulting from stop—go home demand will reduce the value of the bargaining counter and diminish the expertise necessary to remain a knowledgeable participant.

6. The recovery from any substantial rundown of capability in the UK would be particularly difficult, lengthy and costly because of the number of elements in the industrial infrastructure, even though there are one or two large companies which provide some focus.

7. The supply of such complex systems is most likely to be effectively achieved through the clear identification and closely co-ordinated management of responsibilities between the various suppliers and the customer. A focus of expertise by a substantial prime contractor capable of managing the risk/performance trade-offs with a single interface to the procuring authority, appears to be a fundamental element of value for money procurement.

8. It is considered important to differentiate between the Monopoly of Production, which causes worries about the potential threat to competitive pricing and Monopoly of Technology, through which procurement risk can be reduced to achieve value for money and which for certain areas of high technology know-how, the nation cannot sensibly afford to maintain multiple centres of excellence.

The Committee may therefore wish to take these points into account, when they consider further procurement of submarines in the wake of "Options for Change".

16. Memorandum submitted by the Institution of Professionals, Managers and Specialists (26.3.91)

Introduction

1. This Memorandum is prepared by the Institution of Professionals Managers and Specialists on behalf of the non-industrial trade unions representing members involved in the design, overseeing of construction, maintenance and refitting of submarines. These staff are employed in the Ministry of Defence and with the dockyard management contractors at Devonport and Rosyth. The decision by the Government to reduce the submarine fleet had a direct impact on these members by creating major uncertainties for the future and it has brought about over 1700 immediate job losses in the Royal Dockyards.

2. These reductions have caused major problems for the commercial contractors including a large increase in unit cost. However, in order to safeguard the operational requirements of the Royal Navy and to save costs we invite the committee to consider that there is no case to duplicate submarine refitting facilities outside the Royal Dockyards and these must be kept fully up to date for the future. Planning must continue for the next generation of nuclear submarines in order to retain a fleet of at least 12 SSNs. Such action is also essential to maintain the country's ability to design and procure nuclear submarines. We also comment that the reduced fleet of submarines is insufficient to meet the threat of the global proliferation of weapons amongst developing states.

Submarine refitting in the Royal Dockyards

3. The Royal Dockyards employ a highly trained and skilled workforce operating in the marine, nuclear and design areas on submarine refit work. Nearly all posts require special training which is only available at the Royal Naval College Greenwich and at HMS Dolphin, Gosport.

4. Highly specialised facilities are needed to dock and refit nuclear submarines at Devonport and Rosyth which operate Licenced Nuclear Sites. All operations are defined in the Safety Report to comply with the requirements of the Nuclear Installations Act. Capital assets include high integrity shore support facilities such as dual redundant incoming power supplies with high integrity frequency conversion equipment and significant emergency standby generating capacity. Other support services include the provision of steam, air, water and related utilities all to high levels of reliability and quality.

5. Devonport has four licensed docks of which two are also covered for refuelling. Devonport Management Limited stores and handles reactor cores external to submarines and administers radioactive waste. These facilities have an assessed asset value of over £60m. Rosyth has two licensed docks for refuelling and carries out a similar range of nuclear activities to Devonport. These facilities have an asset value of £29m. In addition under construction are two new licensed docks which will be seismically qualified and equipped to refit TRIDENT and all other classes of submarines.

6. Other facilities include a full range of workshops geared specifically to the requirements of overhauling and testing equipment to very high standards. At Devonport these assets are currently being upgraded with at a cost of some £15m. In addition the infrastructure for nuclear submarine support in both dockyards includes the use of highly specialised procedures with a staff whose skills are not available elsewhere.

7. Vickers Shipbuilders (VSEL) are the sole UK builders of nuclear submarines. The TRIDENT programme continues but the current lack of plans for further building after the delivery of the last of the TRAFALGAR class, HMS TRIUMPH, this year is causing major uncertainty at VESL. Cammell Lairds (CLS) are currently building the UPHOLDER class SSK boats. The last will complete in 1993. If no further warship orders are forthcoming this yard will close with a loss of 5,000 jobs.

8. Following the 1990 announcements the number of white-collar dockyard staff involved in submarine refitting fell from about 940 to 620 at Devonport. In Rosyth the programme disruption has been further exacerbated by the engineering problems surrounding the technical defect in the primary cooling systems of the older submarines. In addition the next SSN refit at Devonport was delayed by 24 months and one or more probably two OBERON class boats were removed from the refit load in 1991. This had a major impact on the planning task including the need to cope with a programme now dominated by surface ship work for 18 months until 1992 when submarine load recovers. In both dockyards work had to switch overnight from nuclear refitting of submarines under refit to decommissioning. All in all the direct impact of the reduction was a loss of at least 1000 jobs at Devonport and a projected 700 in Rosyth. Since 1987 the nuclear programme at Devonport has reduced from two-stream refitting coupled with DEDs (docking and essential defects) in the North Lock facilities to the situation now where the next refit does not commence until 1992. Whilst DEDs and decommissionings continue the submarine workload is now only at 30% of its 1987 level at Devonport and 45% at Rosyth.

9. Because of the high levels of fixed costs in the facilities described above unit costs are rising considerably. It is estimated that this increase is some 60% between this year and the next alone. The reasons for these large increases, which makes commercial management and diversification very difficult, should be understood to be entirely beyond dockyard management control.

10. Although an experiment was conducted in 1985 to undertake OBERON class refitting at a commercial yard this has now closed and basic refit and design experience rests entirely with the Ministry of Defence and the dockyard contractors. The experience is that industry alone cannot be expected to retain this capacity and the provision of alternative refitting facilities would duplicate at a large and uneconomic cost those which already exist. We believe it is essential to maintain a viable trade and skills mix capable of maintaining and refitting nuclear and conventional submarines. This now may only just be possible with the current level of programme using existing facilities. The Royal Dockyards offer unrivalled facilities to operate and refit both surface ships and submarines from established centres of naval operations. The reductions in the fleet means that the refit load is much more 'peaky'. The ability to move labour between both types of load drawing on existing skills for the specialist refit tasks gives best overall value for money.

11. Whilst the possibility of maintaining VSEL's viability by extending it into the submarine refitting field may he superficially attractive we consider that to recreate and transfer from what is already in existence in the Royal Dockyards would be against the interests of the taxpayer and the Royal Navy. The new build and refit tasks are significantly different. The major change in facilities is a requirement to cope with used fuel and other radioactive arisings. This requires expensive physical assets operated by a highly trained personnel including Classified Radiation Workers supported by a significant Health Physics organisation. The cost of recreating all this anew we estimate at being well over £200m. This would ultimately have to be absorbed against the MoD load so the taxpayer would bear the cost. Privatisation at VSEL was intended to avoid this type of public sector burden. This would be significantly less if the Royal Dockyards are developed in the most cost effective manner. Furthermore we consider that to place the refit load into VSEL would involve major schedule risks and additional learning costs which would be unacceptable financially and operationally. The Committee will recall that its First Report referred to a potentially major technical defect in the nuclear submarine fleet which presumably could have an operational effect. It is clear that this can only be repaired using current specialised support and facilities in the Royal Dockyards. It is our view that the enhancement of the existing refit sites will offer better value for money for both strategic, workload and schedule considerations. The capabilities to work on both the surface fleet and submarines introduces economy and efficiency with shared costs and infrastructure with considerable labour mobility in order to obtain the lowest unit costs possible.

The Future Submarine Fleet

12. The lack of positive plans for future submarine build is already causing difficulties. The loss of expertise in both the shipbuilder and the MoD overseeing service could have important ramifications for the future. In addition to the effect on VSEL and CLS there is a multitude of firms within British industry supplying submarine platform and weapon equipments which will be at risk of non viability if future submarine procurement is cancelled. Even to maintain a fleet of 12 SSNs into the next century a new class of submarine, or more build of the proven TRAFALGAR class, is needed.

13. We understand that planning for a new SSN 20 class is continuing in a low key. This project is manned up with multi specialist personnel. A delay in the above programme or a decision to build a modified TRAFALGAR class will have serious implications concerning the national ability to design a new class of submarine and manage the procurement. The success of the current nuclear programme is based on design evolution around the US nuclear plant starting with VALIANT and culminating in the TRAFALGAR class. The next submarine requiring significant design input starts a new evolution around the British design nuclear plant. At present the design, procurement project management expertise and experience which is currently provided in-house by MoD staff, and by VSEL in industry, is becoming available from the TRIDENT submarine programme and the UPHOLDER project. Any delay will have a significant impact on the quality of team which can be assembled to get the new submarine design evolution both in-house and in industry, wasting two decades of investment in expertise and resulting in a significant increase in design risk. Such expertise, once dissipated, can be an extremely expensive and time consuming task to reassemble. In contrast the current United States Navy defence financial savings measures in the naval area do recognise the need for the retention of an effective US industrial base.

14. The traditional role of the submarine force committed to NATO is anti submarine warfare. The 'options for change' reductions are firmly focused on the changing European scene. However, we invite the committee to consider whether out of area deployment of submarines should be a possibility for the defence of the UK itself as well as support to NATO and with the Gulf conflict very much fresh in mind possibly the United Nations. We are therefore concerned that a total of 12 nuclear submarines, only six or seven of which might be ready for sea at any given moment, is sufficient to meet the needs of the United Kingdom. The UPHOLDER class upon which very considerable design and development effort has been expended is to reduce in total to only four. To reinstate some cancelled orders could be done at minimum cost as most 'overhead' expenditure is now complete. This would also sustain shipbuilding capacity and subsequently make use of refitting facilities which already exist, at an efficient unit cost.

15. We believe the following quotation by the US Chief of Naval Operations in March 1990 is a sobering appraisal of possible global interests and must be recognised by the United Kingdom and that a diminishing submarine force is not an effective response for the years ahead.

> "The global situation is clearly aggravated by the proliferation of first world weapons among any number of nations than can afford to buy them, or have the technical capability to build their own. Figures, such as a 100 countries with cruise missiles, fifteen with ballistic missiles, over 40 with attack submarines, and 25 either with or developing chemical weapons, are alarming and have serious global implications. Economic and political competition amongst states can escalate quickly when it turns to military competition backed by arsenals of high technology weaponry. In short, whilst the security environment of the nineties may be characterised by a headline which reads 'peace is breaking out' the text tells a more sobering story—one of hope, but punctuated with a need for 'eyes wide open' pragmatism."

Conclusion

16. In summary, whilst IPMS and the non-industrial unions have considerable sympathy for the uncertainties which exist at VSEL and CLS it considers that there is no case on economic or operational grounds to transfer existing refitting facilities from the Royal Dockyards. We question whether the reduced fleet is sufficient to meet the country's needs during an uncertain future and in any case consider that there are grave dangers of losing our submarine design and construction ability if procurement remains at the planned level.

ISBN 0-10-236991-7

9 780102 369915

Printed in the United Kingdom for HMSO
Dd 0507183 6/91 C8 65536 3383/4B 154781 24/20936