Resolution Tempered With Restraint

Lessons from the Cancelled WE-177 Replacement Programme

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Foreword by Professor Sir David Omand GCB

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About the Author

Dr James Jinks is a historian and author. He is co-author, with Lord Hennessy of Nympsfield, of The Silent Deep: The Royal Navy Submarine Service Since 1945 (Allen Lane, Penguin, 2016), and author of the forthcoming A Very British Bomb: A History of the United Kingdom as a Nuclear Power (Allen Lane, Penguin). He is now at work on the authorized biography of Admiral Sir John 'Sandy' Woodward, GBE, KCB, The Last Fighting Admiral: The Life and Times of Admiral Sir John 'Sandy' Woodward, GBE, KCB (Allen Lane, Penguin).

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Foreword

By Professor Sir David Omand GCB

In 1995 I was holding the post of Deputy Under Secretary of State for Policy in the Ministry of Defence. Two years earlier, the decision had been taken to begin to withdraw from service the WE-177 nuclear bombs, then carried by Tornado aircraft of the Royal Air Force. By 1995 the run-down had reached the stage where a decision had to be taken whether it was still essential for the United Kingdom to maintain the national capability to deliver a sub-strategic nuclear weapon as part of its contribution to NATO's defence and deterrence strategy. If that was confirmed as the government's desire then the only viable option was for this to be achieved by having our Trident missile submarines carry a low yield warhead on one of their missiles, in addition to their strategic nuclear outload. It fell to me to put together the advice for the Defence Secretary, the Rt Hon Malcolm Rifkind MP, bringing together all the doctrinal and practical arguments for and against that option. That decision to maintain the sub-strategic role using a Trident missile as delivery system was finally confirmed in the Strategic Defence Review announced in 1998.

The 1993 decision to begin to withdraw the ageing WE-177 air dropped bombs had foreshadowed the eventual ending of the RAF's role in the delivery of the UK's nuclear deterrent. That decision had essentially taken itself. The air dropped weapon was an old design and could not be further renewed or refurbished. It was all too evident that the extreme pressure on the defence budget would rule out what many of us sought which was to start a programme for a new stand-off cruise missile to be developed (with either the US or France as partners) capable of carrying a successor weapon. And to clinch the argument, in any case the technical assessment was that the UK could not build up the additional capacity to design and build a new generation of weapon specifically for the sub-strategic role, given that the overriding priority had to be to be to deliver the strategic weapons to be carried by the Trident D5 missiles in the new Vanguard-class submarines. That was successfully achieved with HMS Vanguard starting its first operational patrol in December 1994.

What makes James Jinks' report into the cancelled WE-177 replacement programme essential reading today is the recent decision by the UK government to acquire the F-35A aircraft so that the RAF can return to the sub-strategic role as part of the NATO DCA force carrying the US B91 warhead. That decision takes us back to the doctrinal case, eloquently

articulated by Sir Michael Quinlan, for the UK, as an independent nuclear power, to be seen by any adversary as a 'second centre of nuclear decision making' within the Alliance. The decision resurfaces the arguments about how the essential conventional and nuclear programmes can be fitted within the constraints of even an increasing defence budget. And reminds us of the continuing capacity constraints on our nuclear weapons design and manufacturing infrastructure and the need to modernise these facilities. The WE-177 replacement story illustrates exactly the factors policymakers will need to consider should the British Government conclude that a requirement exists to reacquire a separate, distinct, *sovereign* UK sub-strategic nuclear weapons capability.

James Jinks has already established himself as a pre-eminent historian of Britain's nuclear weapons development. He has done us a great service in his meticulous reading of the documentary archives of the period since the WE-177 was first conceived, and in filling in the inevitable gaps in the record with in-depth interviews of those involved. His welcome report is a telling illustration of the remark attributed to Sir Winson Churchill, 'the further back I look, the further ahead I can see'.

Executive Summary

On 24 June 2025, the British Government announced that it intended to purchase twelve new F-35A Lightning II fighter jets for the Royal Air Force and to equip them with United States B61-12 sub-strategic nuclear weapons. The aircraft will be assigned to NATO and under the Alliance's nuclear sharing arrangements the B61-12s will remain under US control and custody until their release is authorised by the US President.

The recent Policy Exchange Nuclear Enterprise Commission report: '"Intellectual Rearmament" in the third Nuclear Age, Refreshing the Conceptual Component of British Nuclear Deterrence', argues that Britain's nuclear deterrent and strategy are configured for a strategic environment that no longer exists. It identifies a need to acquire an 'offensive spirit' to deepen the UK's capability to resist nuclear coercion by either enhancing the capability of the strategic Trident system, deepening European nuclear cooperation, particularly with France, and by the development of a lower yield, sub-strategic 'separate, second nuclear system, either sovereign in nature or co-developed' to 'strengthen and complement' the existing strategic Trident system, and 'also provide additional complicating factors through Britain's philosophical role as NATO's 'second centre of decision'.[1]

From the mid 1960s until the late 1990s, three variants of a sub-strategic free fall nuclear weapon known as WE-177 (WE-177 A, B, and C) formed a key part of the UK and NATO nuclear armoury.[2] The weapons, which were carried by a variety of RAF and Royal Navy aircraft and Royal Navy helicopters, were normally assigned to NATO commanders, and unlike the F-35A/B61-12 sub-strategic nuclear weapons, the British Government reserved to right to withdraw them for independent use.

Between 1976 and 1994, the British Government embarked on a highly secret programme to replace WE-177 with a new nuclear armed air launched cruise missile from either the United States or France in what would have amounted to unprecedented development in Anglo-French nuclear collaboration. However, the programme was cancelled in October 1993 following the end of the Cold War.

This report examines the largely forgotten WE-177 replacement programme and identifies the key lessons which policymakers will need to consider should the British Government conclude that a requirement exists to reacquire a separate, distinct, sovereign UK sub-strategic nuclear weapons capability.

It reveals that even at the height of the Cold War in the 1980s, when UK Defence spending as a share of national income was between around 4% and 5%, the Chiefs of Staff and Ministers in both the Thatcher and Major

1. Daniel Skeffington, Edward Barlow, Harry Halem and Air Marshal Edward Stringer CB CBE, 'Intellectual Rearmament in the Third Nuclear Age, Refreshing the Conceptual Component of British Nuclear Deterrence', Policy Exchange, 4 February 2026
2. For a history of WE-177 see John R Walker (2018), 'A History of the United Kingdom's WE-177 Nuclear Weapons Programme: From Conception to Entry into Service 1959-1980', British American Science Information Council (BASIC), 2019

Governments, repeatedly concluded that acquiring a credible sovereign sub-strategic nuclear capability was unaffordable given other defence priorities, and that the UK Atomic Weapons Establishment, which was involved in the design and production of warheads for the Trident system, had insufficient capacity to simultaneously design and produce more than one nuclear warhead.

The report argues that the historical record of the WE-177 replacement programme suggests that, even though UK defence spending is expected to increase to a target of 2.5% of GDP by 2027, given the parlous state of the UK's armed forces, and the UK Atomic Weapons Establishment is occupied with the design and production of a new nuclear warhead for the Trident system, acquiring a separate, distinct sovereign sub-strategic nuclear weapons capability, either independently or in collaboration with an international partner, is likely to be unaffordable without a substantial increase defence expenditure and an expansion in the UK's nuclear weapon design and production capacity.

Synopsis

Throughout the late 1970s and early 1980s Britain's armed Services struggled to define the rationale for a nationally owned sub-strategic nuclear weapons system. There were extensive arguments about whether the use of a sub-strategic nuclear weapon would cause the Soviet Union to pause, reflect and desist, or provoke a disastrous pre-emptive strike. It took until 1986 for a consensus on the rationale to emerge. It rested on the need to:

- underpin the national strategic deterrent, to enhance the UK's overall deterrent posture by having a range of nuclear options.
- provide an independent sub-strategic nuclear contribution to NATO, both to help lock the US into the defence of Europe and to complicate Russian assessment of likely Alliance reactions in a crisis.
- have a capability to deter nations outside the NATO area which could acquire a nuclear weapon at a future date, but without the need to rely on Trident which, under certain circumstances, could appear incredible or be inappropriate.

After the Cold War ended it was argued that a separate system was also required to:

- provide an insurance against the risk that the credibility of a US extended nuclear guarantee may decline over time, should the US and Europe drift apart.
- provide a system which, alongside French nuclear systems, could contribute to the nuclear defence of Europe.

To turn this rationale into reality, numerous delivery systems were

considered including cruise missiles, ballistic missiles, free-fall bombs, and where relevant, torpedoes. National solutions, a Short-Range Air Launched Stealthy Cruise Missile (SRALSCM) and a Medium Range Air Launched Ballistic Missile (MRALBM); US delivery systems, the Short-Range Attack Missile (SRAM) T, the Tactical Integrated Rocket Ramjet Missile, (TIRRM); and French delivery systems, the Air-Sol Moyenne Portee (ASMP), the ASMP II (SASM), and the Air Sol Moyenne Portee D2, (ASLP D2), were all considered. The Chiefs of Staff and Ministers were horrified at the cost estimates and decision making was repeatedly delayed.

In July 1991, the Navy withdrew its involvement. Following the collapse of the Soviet Union in September 1991, the US cancelled SRAM-T, and in November 1991, NATO announced 80% reductions to its sub-strategic nuclear weapons. With the Cold War over and the Treasury demanding cuts to the Defence Budget, a distinction was made between the need for a capability and the need for a separate system to embody it. The MOD argued that Trident could meet the sub-strategic requirement at practically no additional cost, and that savings were possible if WE-177 was withdrawn from service as soon as Trident entered service in 1994. Ministers approved and the WE-177 replacement programme was cancelled in October 1993.

Key lessons for current Policy Makers

The decision to rely on Trident, a strategic system, to fulfil the UK's sub-strategic requirements was a pragmatic solution largely driven by the Government's desire to save money.

Should the British Government decide that it once again requires a separate distinct and sovereign sub-strategic nuclear capability, there are many lessons from the WE-177 replacement programme that would still apply to any future programme. Policy makers will need to consider the following:

First, whether the rationale articulated during and immediately after the Cold War remains relevant today? Is a UK sub strategic capability required to underpin the national strategic deterrent, to enhance the UK's overall deterrent posture by having a range of nuclear options; to provide an independent sub-strategic nuclear contribution to NATO, both to help lock the US into the defence of Europe and to complicate Russian assessment of likely Alliance reactions in a crisis; to have a capability to deter nations outside the NATO area which could acquire a nuclear weapon at a future date, but without the need to rely on Trident which, under certain circumstances, could appear incredible or be inappropriate; and to provide an insurance against the risk that the credibility of a US extended nuclear guarantee may decline over time, should the US and Europe drift apart and to provide a system which, alongside French nuclear systems, could contribute to the nuclear defence of Europe.

Second, the subject of sub-strategic nuclear weapons does not lend itself to categorical assertions, but rather to a series of judgements based on a variety of often conflicting considerations. There may be no absolute answers. Whether the UK requires a sub-strategic capability is likely to depend on an assessment of relative priorities.

Third, any study of a future British sub-strategic nuclear capability needs to consider whether a continued UK contribution to NATO's nuclear mission should necessarily be provided by nationally owned weapons or whether US provided dual key systems suffice. Dual key systems are likely to be a more economical method of contributing to NATO's nuclear capability and of indicating to Russia and NATO allies a continuing commitment to the Alliance and its nuclear posture.

Fourth, any study of a future British sub-strategic nuclear capability must decide whether a sub-strategic nuclear capability is primarily required for deterrence/political signaling purposes, warfighting, or both. The answer

will influence decisions about delivery systems.

Fifth, the WE-177 replacement programme indicates that on the grounds of commonality, cost and timescale, there are considerable benefits to utilizing delivery systems already in existence or under study or development. Purely national developments are likely to be high risk on technical grounds and cost. An international collaborative development; a US collaborative development; a French collaborative development; and an off the shelf purchase will likely be the most effective solution.

Sixth, selecting an existing delivery vehicle involves a complex political balance. Given the UK's longstanding and intimate nuclear relationship with the US, a US delivery vehicle is undoubtedly the logical choice. However, a French delivery vehicle would significantly boost Anglo-French defence relations and would be seen as a demonstration of a stronger UK contribution to European defence. However, UK cooperation with France could adversely affect the UK's longstanding relationship with the US, particularly on nuclear matters, especially if the decision was made to use a US warhead design and marry it to a French delivery system. But not choosing a French delivery system would likely be interpreted as a serious setback to Anglo-French relations. Collaboration is likely to be seen as a touchstone of Anglo-French bilateral defence relations.

Seventh, at the height of the Cold War AWE lacked the design capability, manufacturing capacity, and availability of skilled staff to design, produce and place into service more than one nuclear warhead at a time. The WE-177 replacement programme suggests that the major factor affecting the timescale for the introduction of any new nuclear system will be the capacity of the Atomic Weapons Establishment (AWE), which is currently occupied with certifying the safety and reliability of the existing Mk.4A Holbrook warheads for the Trident system, and designing and producing the Trident successor warhead, the A21/Mk7 Astraea.

Eighth, collaboration with France on a new nuclear warhead could constitute such a significant realignment of the UK's nuclear efforts that it could carry unacceptable risk to the vital relationship with the US under the 1958 Agreement. Depending on the exact form of cooperation, there could be significant political penalties and almost certainly additional costs.

Ninth, the financial and political implications of acquiring a new nuclear weapons system will be considerable. There is no provision in the MOD budget for a sub-strategic delivery vehicle or nuclear warhead. The cost will be virtually impossible to conceal and is likely of itself to be a potential cause of public contention.

Finally, while much has changed since the end of the Cold War, perhaps the enduring lesson from the WE-177 replacement programme is that the fundamental problem which has troubled British nuclear policy since the dawn of the nuclear age remains: It is not a question of what the Government would like to do, but what it can afford to do given the strategic environment it now faces.

Introduction

On 24 June 2025, the British Government announced that it intended to purchase twelve new F-35A Lightning II fighter jets for the Royal Air Force and to equip them with United States B61-12 tactical nuclear weapons. The aircraft will be assigned to NATO and under the Alliance's nuclear sharing arrangements the B61-12s will remain under US control and custody until their release is authorised by the US President. Throughout the Cold War the British Government operated both strategic nuclear weapon systems, such as Polaris/Chevaline and Trident, as well as several sub-strategic weapons. (Although the terms tactical, theatre and sub-strategic were common nomenclature throughout different periods of the 1970s and 1980s, for consistency the term sub-strategic is used throughout this paper).[3] From the mid 1960s until the late 1990s, the Royal Air Force was equipped with three variants of a sub-strategic nuclear weapon known as WE-177 (WE-177 A, B, and C), which formed a key part of the UK and NATO nuclear armoury. During the closing years of the Cold War the British Government embarked on secret programme to replace WE-177 with a new air launched sub-strategic nuclear weapon system, developed in collaboration with either the United States, or France, in what would have amounted to unprecedented development in Anglo-French nuclear collaboration. However, following the end of the Cold War, and the considerable reductions in defence expenditure which occurred in the early 1990s, the replacement programme was cancelled in October 1993 and the RAF retired from the nuclear role in 1998.

Given the changed security environment today, one question which remains is whether a requirement exists for an independent UK sub-strategic nuclear weapons capability, which can serve as an independent deterrent, but also as a contribution to NATO's nuclear mission. On 8 January 2026, Luke Pollard, the Minister of State, maintained that the Government 'has no plans to expand the UK nuclear deterrent beyond our existing submarine-based system', though he noted that the Government 'continues to keep its nuclear posture under constant review in light of the international security environment and the actions of potential adversaries.'[4] This report documents the highly classified and largely forgotten WE-177 replacement programme, one of the many complex defence and nuclear related problems - the original Trident procurement, debates about NATO nuclear strategy, the 1981 Defence Review, the 1982 Falklands Conflict etc – confronted by the MOD, Chiefs of Staff and Ministers throughout the final decade of the Cold War, and its immediate aftermath.[5] It identifies the key lessons which policymakers will need to consider should the British

3. There is a wider debate to be had as to whether the distinction between strategic and sub-strategic nuclear systems remains appropriate in the 21st century, and how to best define sub-strategic capabilities, i.e. by target or yield.

4. Hansard, House of Commons, Written Answer, Luck Pollard,, 8 January 2026; The Government maintains that 'A submarine based system remains the most effective and proportionate means of delivering the UK's deterrent objectives, providing the survivability, assurance and operational independence we need.' HC 1658, House of Commons Defence Committee, The UK Contribution to European Security: Government Response, Sixth Special Report of Sessions 2024-26

5. See Nick Ritchie and John Walker, 'Irreversibility and Nuclear Disarmament: The Case of Denuclearising the Royal Air Force', Irreversible Nuclear Disarmament: York Report No.3 April 2024, pp.18-25

Government conclude that given the changed strategic environment, a requirement exists to reacquire a separate, distinct, sovereign UK sub-strategic nuclear weapons capability.

A Short History of UK Tactical Nuclear Weapons

The first British atomic weapons, the free fall bombs, Blue Danube and Red Beard, which were carried by the Royal Air Force 'V'-Force, were referred to as 'kiloton' weapons. Their yield was in the 'kiloton' range and early British war plans envisaged their use against the key Soviet military targets which were thought to be the greatest threat to the UK during the initial phase of any conflict, such as airfields, submarine pens, etc. In December 1954, the NATO Council decided that military planning should be based on the use of nuclear weapons, with the proviso that decisions concerning their use would remain with the Governments concerned. To account for this change NATO members embarked on the gradual process of reorganising and reequipping their forces. At the same time, the Eisenhower Administration introduced a 'New Look' defence policy which involved the deployment of 'tactical' nuclear weapons, small in yield, which the administration argued, could be used on the conventional battlefield "just as bullets would be used".[6] The Administration, worried about increasing public concerns about the destructive effects of the Hydrogen Bomb, urged the British Government to 'consider making suitable opportunities to make clear the technical and moral justification for the use of tactical nuclear weapons.'[7] While the Chiefs of Staff and the Cabinet worried that 'An attempt to divide them into those which are small and therefore morally justifiable and those which are large and therefore immoral would inevitably reduce the deterrent value as a whole', the Services concluded 'that unless this country possesses these tactical weapons it will not be possible to reorganise the Forces for effective use in future war, even in future limited war.'[8]

By the 1950s, the UK Atomic Weapons Research Establishment (AWRE) was attempting to develop a British Hydrogen Bomb. Alongside the first British 'megaton' weapons, Violet Club, Yellow Sun, and following the resumption of the Anglo-American nuclear collaboration in 1958, the first true service H-Bomb, Yellow Sun Mk.II, AWRE mastered the science of producing a wide variety of small sub-strategic nuclear weapons which could be adapted for several uses.

WE-177 was developed in the 1960s to replace Red Beard and Yellow Sun which were both incompatible with the high-performance low-level tactics which were becoming increasingly necessary for aircraft to penetrate Soviet defences. They were also considered unsatisfactory from the point of view of weapon safety. Although the original requirement

6. See, Simon Moody, *Imagining Nuclear War in the British Army, 1945-1989* (Oxford University Press, 2019), pp.34-39
7. TNA/CAB/129/74, C.(55)95, 5 April 1955, Annex 1, Washington to Foreign office, 16 March 1953; TNA/CAB/129/74, C.(55)95, 5 April 1955
8. TNA/AVIA/65/1114, D.R.P.(A.E.S)/P(56)9, Defence Research Policy Committee, Sub-Committee on Atomic Energy, Report by the Atomic Energy Sub-Committee, 13 June 1956

envisaged a weapon of low and intermediate kiloton yield for use against point targets (small targets which required accurate placement), it was the high yield version, the WE-177B, which was first produced and first entered service between 1966 and 1967 to meet the low-level delivery requirements of the V-Force prior to the introduction of Polaris. The WE-177A entered service between 1969 and 1972, and WE-177C between 1973 and 1977. The initial design life requirement was eight years, but this was subsequently doubled to 16 years, and then 20. Most of the weapons were assigned to NATO, which in 1967 adopted a new nuclear strategy, MC 14/3, known as 'flexible response', which provided NATO with a range of conventional, sub-strategic and strategic nuclear options in the event of war, but could have been withdrawn, if required, for independent national use.

For much of the Cold War little was known about the UK's sub-strategic nuclear forces, their capabilities, or cost. The weapons were domestically produced in their entirety and the technology they employed was not generally perceived to be threatening nor their possession provocative. Unlike the UK strategic deterrent, Polaris and Trident, they were not a matter of repeated public controversy, and they were not the subject of debate in any arms control forum.

The Initial Replacement Debates

By the end of the 1970s, the MOD started to consider how to replace WE-177. The initial service life of 20 years, would have resulted in the progressive withdrawal of the weapons from service between 1986 and 1997, starting with WE-177 B in 1986, WE-177 A between 1989 and 1992, and WE-177 C between 1993 and 1997. Retaining the weapons in service would have involved AWRE conducting a deep refurbishment process, which would have involved the replacement of nearly all major items.[9] Given the extent and cost of such a refurbishment programme, at the end of 1976, AWRE completed a short study of the possible replacement of WE-177 with a new modernised free-fall bomb.[10] However, the services wanted a new weapon and AWRE concluded that replacing WE-177 on a one-to-one basis would have required twice as much plutonium, and a 50% increase in all plutonium then available for defence purposes.[11]

In October 1977, the Chiefs of Staff concluded that there was an urgent need for a fundamental review of the UK's basic policy for sub-strategic weapons.[12] The Defence Policy Staff concluded that sub-strategic weapons would remain essential to the NATO strategy of flexible response, that they 'provided an indispensable link between conventional and strategic nuclear forces, and that it was to the United Kingdom's political and military advantage to continue to contribute forces equipped with nationally owned warheads to NATO's tactical nuclear armoury.'[13] The Chiefs agreed and in March 1978, a Theatre Nuclear Weapons Policy Steering Group (TNWPSG) was established inside the MOD (in effect a subcommittee of the Chiefs of Staff Committee) to guide and coordinate work to determine UK nuclear weapons requirements for sub-strategic roles beyond 1985; the general scale and character of any requirements for delivery vehicles and for such weapons, especially cruise missiles.[14]

At the same time, Sir Anthony Duff, the Deputy Under Secretary for Defence and Intelligence at the Foreign Office, was carrying out the first high level conceptual review of UK national targeting in many years as part of the initial phases of the Trident programme. This work included an examination of what were described as national Limited Nuclear Options (LNO), a possible requirement for sub-strategic nuclear weapons capable of striking the Soviet Union. A number of Limited Nuclear Options (LNO) under a new terminology, Sub Strategic Nuclear Options (SSNO), were identified in recognition that 'In circumstances where Allied deterrence has broken down and the Soviets threaten action against the UK for which the use of our national ultimate strategic capability may be considered too escalatory, Ministers might at very short notice require the Chiefs of

9. TNA/DEFE/19/195, UK Nuclear Weapons – Stockpile Production and Upkeep, April 1977
10. TNA/DEFE/19/195, Challens to Macklen, 24 January 1977; TNA/DEFE/19/195, UK Nuclear Weapons – Stockpile Production and Upkeep, April 1977
11. TNA/DEFE/19/195, Fakley to Macklen, 2 May 1977
12. TNA/DEFE/72/614, Future Tactical Nuclear Weapons Policy, 10 October 1977 – 19 July 1979
13. TNA/DEFE/25/433, Mason to PS/Secretary of State, 9 January 1979
14. TNA/DEFE/25/433, Mason to PS/Secretary of State, 9 January 1979; TNA/DEFE/69/1438, Larken to DN Plans, 17 October 1984

Staff to present them with Sub Strategic Nuclear Options'. After 'much illuminating argument' over SSNOs, the Chiefs accepted that SSBNs were unsuited for the SSNO role and in 1983, the 'Chiefs viewed with approval the prospect of continuing the development of SSNOs, earmarking AFD [Air Force Department] assets but not SSBNs.'[15] This reinforced the case for a successor system.

Defining the requirement

In December 1978, the Operational Requirements Committee (Nuclear) (ORC(N)) endorsed a joint Naval/Air Staff Target, NAST 1231, for a replacement for WE-177.[16] Although a Feasibility Study was completed in March 1980, when the ORC(N) met on 22 May 1980 to consider its conclusions changes to the Trident programme schedule and 'new' information about the resources available at AWRE, which was occupied with the design and production of warheads for the Trident system, indicated that a new sub-strategic nuclear weapon could not enter service before the mid 1980s and production before the early 1990s.

With the defence budget under severe pressure the TNWPSG concluded that in light of the changed timescale a fundamental re-appraisal of the UK's policy towards sub-strategic nuclear weapons was required to define an agreed policy, clarify why such a capability was required, and identify the various delivery systems, including the numbers, yields, delivery methods and costs of the weapons required.[17] The Assistant Chief of the Defence Staff (Policy) agreed to undertake a study in conjunction with the Defence Secretariat.[18] The Terms of Reference for 'A Study on the UK TNW' were agreed on 3 July 1980 and the first draft of 'A Reappraisal of the UK Policy for TNW', was completed on 8 October 1980.[19]

As part of the work a technical study of the nuclear warhead possibilities, set against the context of specific delivery systems was conducted by the Royal Aircraft Establishment (RAE) Special Weapons Department.[20] Only those delivery systems which were likely to be available within NATO in the appropriate timescale were considered. They included cruise (including stand-off) missiles, ballistic missiles, free-fall bombs, and where relevant, torpedoes, with as much data as possible provided on the effectiveness, costs and timescales of the different options, along with potential technical problem areas.[21] Each was then assessed in as much depth as possible against classes of targets: When the report appeared in April 1982, it included a short list of options capable of attacking the recommended target types in the 1990s.[22]

a. Major military targets in the Soviet Union
    a. Ballistic missile, such as Pershing 2

b. Interdiction and other deep targets
    a. Ballistic missile

c. Battlefield targets

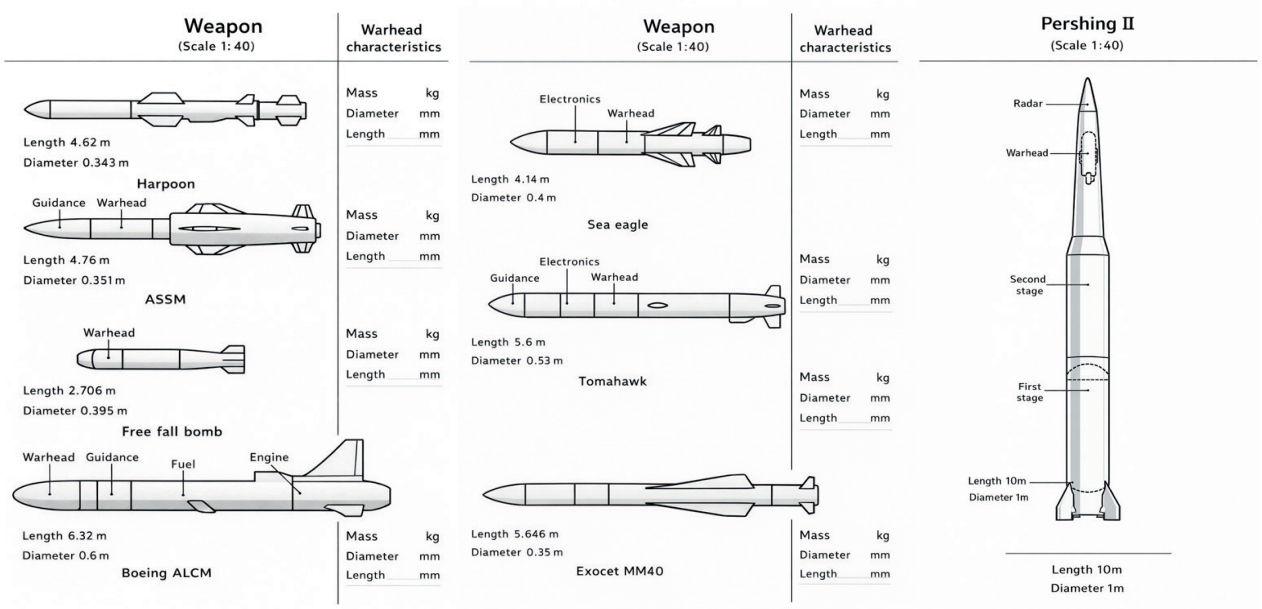
15. TNA/DEFE/69/1307, Annex F to DN Plans 34/2, 28 June 1983
16. TNA/DEFE/25/433, Mason to PS/Secretary of State, 9 January 1979
17. TNA/DEFE/69/1307, Annex B to DN Plans 34/2, 28 June 1983; The Terms of Reference for 'A Study on the UK TNW' were agreed on 3 July 1980 and the first draft of 'A Reappraisal of the UK Policy for TNW', was completed on 8 October 1980; TNA/DEFE/69/1307, Annex B to DN Plans 34/2, 28 June 1983
18. TNA/DEFE/69/1307, Annex B to DN Plans 34/2, 28 June 1983
19. TNA/DEFE/19/610, Eyere to CDS, 20 July 1981
20. The work was supported by AWRE, the Defence Operational Analysis Establishment, (DOAE), the Admiralty Underwater Weapons Establishment (AUWE) and the Admiralty Surface Weapons Establishment (ASWE).
21. TNA/DEFE/24/2995, Director of Naval Plans, Maritime TNW Policy, 22 December 1983
22. TNA/72/302, DCRP 4 February 1982; TNA/DEFE/69/1307, Dommett to Hughes, 6 January 1982; TNA/DEFE/72/302, Preliminary Assessment, 30 April 1982

a. Boost glide missile, such as T16
b. Ballistic Missile, such as Lance 2
c. Tornado plus free-fall bomb

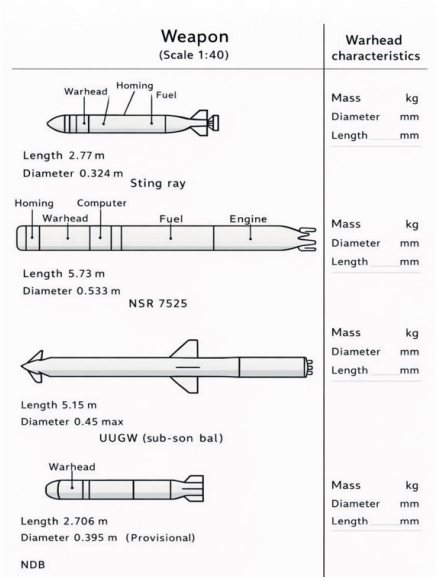
d. Major surface warships or groups
   a. Super-sonic sea-skimmer, such as NATO ASSM
   b. Heavyweight Torpedo (NST 7525)
   c. Ballistic Missile

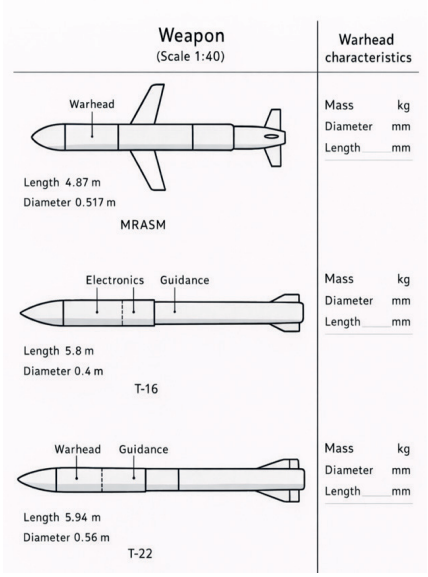
e. Submerged Submarine
   a. Nuclear depth bomb

The report concluded that 'of the types considered the most feasible is the ballistic missile although a homing system variant would be needed for ship targets', and that 'In small scale attacks against well defended targets subsonic vehicles (such as GLCM, ALCM, MRASM, Sea Eagle and Tornado, plus free fall bombs) are likely to be effective.'[23] The analysis indicated that no single weapons system which was likely to be available in the NATO inventory in the 1990s would be credibly able to effectively attack the full range of required submarine, ship and land targets, that torpedo-based options looked doubtful in terms of cost effectiveness, and that free-fall bombs were possibly limited in their range of applications in the longer term.[24] It was also apparent that conversion of a conventional weapon to a nuclear weapon was 'by no means a simple task', and any further 'meaningful refinement of options for further study requires a "political" input (TNW scenarios, target priorities, basing philosophy etc).'[25]



23. TNA/DEFE/72/302, Preliminary Assessment, 30 April 1982
24. TNA/DEFE/72/302, DCRP to DUS(P), 21 May 1982





RAE Preliminary Assessment of Delivery Vehicles

RAE continued with a range of preliminary studies of possible delivery vehicles and their capabilities, with particular focus on the application of the US Pershing II and possible UK ballistic missile systems, and also the relationship of the requirements to a range of vehicles under consideration for the NATO long range stand-off conventionally armed missile studies, such as the Long Range Stand Off Missile programme, a joint development effort between the UK, US and Germany.[26]

Failing to Articulate the Requirement

Defining the rationale was complicated.[27]For every argument in favour of a sub-strategic capability there was a counter argument, which arose because of the greater uncertainty which existed about how an opponent would react to each of the scenarios considered. This was much more the case for sub-strategic nuclear weapons than for strategic weapons because of the greater uncertainty as to the response of an opponent to something less than an all-out strategic nuclear attack.[28]

Initial drafts of the rationale rested heavily on assumptions of Soviet perceptions, attitudes and probable responses, some of which were 'flimsy', and drafts were criticised for defining 'weapon characteristics without establishing an adequate case for a weapon in the first place.'[29] There was a tendency for NATO and National requirements for sub-strategic nuclear weapons to become 'confused and interwoven even within paragraphs', and there was a failure to distinguish 'between political signaling and warfighting, and then to articulate it coherently.'[30] When the services commented on drafts their 'comments were somewhat philosophical and conflicting' and cross referencing the various contributions was 'a feat of gymnastics.'[31]

When the first draft of the rationale appeared in November 1982 it deduced two permutations of delivery vehicles, which were judged to

25. TNA/DEFE/72/302, 'A Broad Review of UK TNW Concepts for the 1990s', Presentation by RAE Special Weapons Dept to Theatre Nuclear Weapons Policy Steering Group, 15 September 1982
26. TNA/DEFE/72/302, Dawton to DCRP, 7 June 1982
27. TNA/DEFE/72/302, Dawton to DCRP, 7 June 1982; TNA/DEFE/69/1307, Annex A to CDS 1140/1, 1 October 1982, Terms of Reference for A Study to identify the Delivery Vehicles Best Suited to UK Nuclear Weapon Requirements Post – 1995; TNA/DEFE/69/1307, Annex C to DN Plans 34/2, 28 June 1983; The files in which the full reports are contained remain classified. See TNA/DEFE/24/3008, UK Nuclear Policy: UK Theater Nuclear Weapons Study, 1 June 1981-31 March 1983; TNA/DEFE/68/855, UK Nuclear Weapons Policy: Theatre Nuclear Weapons Policy Study Group, 27 October 1981 – 18 August 1983; TNA/DEFE/24/3092, UK Nuclear Weapons Policy: Theatre Nuclear Weapons Policy Study, 1 April 1983 – 31 March 1984; TNA/DEFE/24/3093, UK Nuclear Weapons Policy: Theatre Nuclear Weapons Policy Study, 1 April 1984 – 31 August 1984
28. TNA/DEFE/69/1438, Hughes to AD of DPS(N), 3 September 1984
29. TNA/DEFE/19/610, Hughes to Head of DS17, 7 August 1984
30. TNA/DEFE/69/1307, VCNS to DUS(P), July 1983; TNA/DEFE/ Milne-Home to AD Nuc DPS(N), 7 December 1982
31. TNA/DEFE/69/1307, Annex C to DN Plans 34/2, 21 June 1983

provide maximum flexibility with the minimum number of candidate systems: an Air Launched Ballistic Missile/Nuclear Depth Bomb, and a Ground Launched Ballistic Missile/Nuclear Torpedo. However, it was criticised for failing to properly rehearse the rationale for a nationally owned sub-strategic nuclear capability, and for being too biased towards when the deterrent fails, and for failing to differentiate sub-strategic nuclear weapons from strategic nuclear weapons and to establish separately what the capability was to do both nationally and in the NATO context.[32]

As a result, when the TNWPSG met in June 1983, it was 'faced with making a decision based on fairly uncertain information' and there was 'a 'lack of full agreement between the Services on the rationale for UK TNW as a whole.'[33] The Group agreed that once again it was 'necessary and desirable to rehearse in full the rationale for retention' and 'to recapitulate in some detail the rationale for the TNW requirement, so that final judgements could be made by the COS and by Ministers in the light of all the considerations.'[34] The group also felt that the report 'had narrowed down the options further than was desirable at this stage' and more work 'was required to show 'how cost sensitive the options were'. A planned submission to the Chiefs was postponed by eighteen months to December 1984.[35]

Although by the end of 1983 a great deal of paperwork had been generated and little had been achieved, some key conclusions were already apparent. Very substantial costs would be involved in providing a replacement system and warhead, and no one single delivery system would satisfy all the potential requirements. Difficult judgements were required on the nature of the systems required for both political signalling and warfighting, and if different weapons were required for use against land and sea targets the systems would have to be developed sequentially and not in parallel because of AWRE's limited capacity to develop and produce warheads.[36] This remained true even if it was desirable to have a common nuclear physics package for land/air and maritime delivery systems.[37] Overall, additional work was required to show how cost-sensitive various options were, and to provide a full range of complementary technical and financial information.

A Matrix of Options

Starting in mid-November 1983, the first of five detailed studies was conducted by RAE on tactical nuclear weapon delivery systems under the codeword ACCENTUATE.[38] The first report, which was completed in October 1984, contained a matrix of options, encompassing land, sea (surface and submerged) and air launched missiles, of the cruise, boost-glide or ballistic type, and identified distinct variants, such as sub-sonic/supersonic cruise vehicles of different ranges, different guidance systems, and varying degrees of stealth.[39]

To provide firm reference points, three specific options were examined in depth: air lunched ballistic missiles (ALBM); a ground launched ballistic missile (GLBM); and a subsonic cruise missile, with varying degrees of

32. TNA/DEFE/69/1307, Chandler to DN Plans, 14 December 1982
33. TNA/DEFE/69/1307, Director of Naval Plans, Maritime TNW Policy, 6 July 1983; TNA/DEFE/19/610, Hughes to AD of DPS(N), 3 September 1984
34. TNA/DEFE/69/1307, Minutes of the meeting of the Theatre Nuclear Weapons Policy Steering Group, 10 June 1983; TNA/DEFE/69/1307, DUS(P) to SECCOS, 11 August 1983
35. TNA/DEFE/69/1307, DUS(P) to DCA(RT), 19 August 1983; TNA/DEFE/69/1307, Oswald to DUS(P), 30 June 1983; TNA/DEFE/69/1307, Larken to VCNS
36. TNA/DEFE/69/1307, Report on TNWPSG Meeting – 10 June 1984; The work, known as RP675, was led by RAE's Special Weapon Department and included contributions from industry, notably British Aerospace and Hunting Engineering.
37. TNA/DEFE/69/1307, DUS(P) to SECCOS 11 August 1983
38. TNA/DEFE/25/678, Minutes of the Seventh Meeting of the TNW Delivery Systems Steering Group, Held on 11 December 1986
39. The full report remains classified. The description of its contents and conclusions has been pieced together from various open sources. The full report is here: TNA/DEFE/71/1302, Future Tactical Nuclear Weapon (FTNW): Farnborough Study Report, 15 October 1984

stealth and relevant launch problems. As it was clear the UK only had the resources to develop one nuclear weapon at a time, and that deterrence rather than 'war fighting' was seen as the primary criterion, attention was concentrated on systems with a capability against land targets, though attacks against maritime surface forces was 'taken into account'. Boost glide and supersonic cruise missiles were not examined as previous studies had indicated that these were unlikely to show any technical, operational or cost benefits over the alternatives.[40]

The report concluded in substantial technical detail that there were some technical advantages in air launched systems, as the range of the weapons system was derived in part from smaller and cheaper aircraft missiles, and air launched systems were more flexible and likely to lend itself more readily to dual capability. It highlighted that any long-range cruise or ballistic missile would require a sophisticated navigation and/or terminal homing system to achieve an accuracy better than 500m CEP, and that for a ballistic missile, the development of terminal homing would likely involve high technical risk, though cruise missile homing technology was well understood. While a ballistic missile was projected to have a good capability to penetrate Soviet defences, for a cruise missile further work was required to reduce radar echo areas and other detection signatures to levels which would permit adequate penetration of air defences.

In addition, although cruise missiles were likely to be of significantly lower unit cost than ballistic missiles, further work was required before a judgement could be made on the relative effectiveness of each of the weapons. While these long-range options were the focus of the study, short range options were also briefly considered. A boosted bomb with inertial guidance could provide delivery options of 50 – 100 km range for supersonic low level stand off of 100 – 150 km for a ballistic type trajectory. This option offered a capability against mobile targets whether on land or see as well as fixed targets. Costs, while not determined, were expected to be less than the other costed options.[41]

Redefining the Rationale

In parallel to the delivery vehicle work, further attempts to define the rationale were undertaken.[42] The revised paper took the form of an *ab initio* consideration and was 'written against a recognition that the subject does not lend itself to categorical assertions, but rather to a series of judgements based on a variety of often conflicting considerations.' It did not form definitive conclusions, nor did it attempt to assess priorities between possible requirements for tactical nuclear weapons and other calls on the defence budget. It recognised that there might be no absolute answers to the questions posed, and that a decision on replacement was likely to depend on an assessment of relative priorities.

Given the complexity of the task and the philosophical nature of much of the discussion, Sir Richard Norman, the Chief Scientific Adviser in the MOD, embarked on a 'a mind-clearing exercise' and formed a 'think tank', an informal study group, and held a number of discussions with CSA

40. TNA/DEFE/69/1327, Programme of TNW Studies, 22 July 1983
41. TNA/DEFE/69/1438, Note on the RAE Report on TNW Delivery Systems, 14 November 1984
42. TNA/DEFE/19/610, Mason to Nicholls, 17 August 1984; TNA/FCO/46/5340, Lever to Daunt, 9 July 1986

staff and the Directors of AWRE and RAE to try to crystalize the complex political, operational, technical and financial factors.[43]

The 'think tank' went back to first principles and started by addressing the philosophy of deterrence and the importance of sub-strategic nuclear weapons in that philosophy. It argued that deterrence relies on the possession of a strategic capability capable of inflicting unacceptable damage on an adversary and the means to convince that adversary that there is a significant possibility of its use. It argued that a paradox exists if deterrence is based solely on the threatened use of an 'ultimate' strategic weapon: the possibility of such a weapon being used under circumstances which leads to mutual unacceptable damage or destruction could be regarded as zero, which undermines its deterrent value. Moscow could discount the credibility of the UK strategic deterrent because of the inevitable suicidal retribution it would bring on the British Isles, or by discerning a lower political determination to nuclear deterrence, or a mixture of both.

The 'think tank' argued that this paradox could be countered by the deployment of a lower-level nuclear system underpinning the strategic system, which a potential aggressor could perceive as more likely to be used because it would not automatically lead to mutual assured destruction. This risk, and its nuclear nature, provided an escalation link to the ultimate strategic force. As such, the 'think tank' argued that the possession of sub-strategic nuclear weapons restored and underpinned the credibility of the strategic deterrent. Although the Soviet Union declared that any use of nuclear weapons by NATO would lead to an all-out Soviet Nuclear response, the 'think tank' considered that it was not unreasonable to regard the Soviet position as a declared deterrence posture, and that such a statement reflected Soviet concern that there was a higher possibility of the use of sub-strategic nuclear weapons.

Norman's 'think tank' report largely mirrored the work of the revised paper on the rationale.[44] It began by setting the strategic context in which the question of replacement should be considered and discussed the Soviet perception of the UK's nuclear capability. It then discussed the rationale for an independent UK capability in terms of its inherent military value, its role within the context of the NATO Alliance, and finally its significance in underpinning the credibility of the strategic deterrent. It then outlined the capabilities which such a force might need to possess in terms of range, and in terms of force size. Desirable system characteristics and the suitability of various launch platforms and delivery vehicles with the necessary characteristics were then discussed, as was the potential for the use of Submarine Launched Ballistic Missiles (SLBMs) in the sub strategic role. It also outlined the potential arms control and public opinion implications.[45]

The report's conclusions were finely balanced. While it 'recognised that there is a strong case for the UK continuing its sub-strategic nuclear role within NATO', it suggested 'that the fact of UK ownership of TNW warheads assigned to NATO is not central to that role; and that independent UK weapons contribute additionally to deterrence only if there is a credible

43. TNA/DEFE/19/610, Mason to DUS(P) Nicholls, 17 August 1984

44. See Annex I

45. TNA/DEFE/69/1438, Larken to VCNS, 28 September 1984

national rationale for their employment.' It also concluded 'that any continued UK contribution to NATO is not of itself a sufficient rationale for a UK force; and that the means of sustaining a NATO role cannot finally be determined until… the nature of any national requirement' was established. It also concluded that there was 'no case for the UK to possess an independent sub-strategic force exclusively for warfighting purposes against the Soviet Union' and that while 'a UK TNW force may be more likely to deter a "third world" nuclear threat than a UK strategic force… we doubt whether by itself this constitutes a sufficient rationale for a UK force.' Furthermore, 'that the case for or against an independent TNW capability depends critically on the extent of its contribution to the credibility of the independent strategic deterrent' and that overall 'a judgement is required' as to whether the existence of a lesser capability than the strategic deterrent is essential; or whether it is desirable but not essential; or whether such a capability is neither essential nor desirable for the credibility of the national strategic deterrent.[46]

This attempt to define the requirement led to protests, particularly from the Vice Chief of the Naval Staff, who wanted an 'intellectually honest exercise, based on "first principles"'.[47] In essence the arguments boiled down to whether the use of a sub-strategic nuclear weapon would cause the Soviet Union to pause, reflect and desist, or provoke a disastrous pre-emptive strike. There was a view, supported by extensive US wargaming, that any use of a sub-strategic nuclear weapon stood a very high chance of misinterpretation, a notion which the USSR would likely do its utmost to promote. If this was the case, then the uncertainty which existed about how the Soviets would interpret the signal and then respond, could make the whole concept on a sub-strategic nuclear weapons capability impractical.

On the one hand, it was argued that any NATO first use of sub-strategic nuclear weapons might result in the general release of Soviet nuclear weapons.[48] On the other, it was argued that the possession of sub-strategic nuclear capability would create so much uncertainty in the minds of the Soviet leadership that such a capability would provide the Government with very worthwhile deterrent effect. The report even went as far as to argue that a sub-strategic potential for Trident was likely to be of value irrespective of whether the Government decided to employ it.

When the TNWPSG met on 3 October to consider the report, it concluded that it was important for the UK to possess a sub-strategic nuclear capability which could hold at risk military targets. The group also discussed briefly the scale of force required, though no judgements or tentative conclusions were reached.[49] When the group met again on 1 November, this time to consider the RAE Report on the candidate systems, it became clear that there was still a great deal of work required before the group could make specific recommendations to the Chiefs. Much of the work to date had been focused on war fighting as opposed to deterrence, and the characterization of candidate weapon systems had not been related to one another in a logical manner. The effectiveness of systems from the

46. TNA/DEFE/69/1438, TNWPSG(84)1(Final), An Examination of the Rationale for Independent United Kingdom Theatre Nuclear Weapons (Paper by Defence Secretariat 17 and the Defence Programme Staff (Nuclear)), 14 September 1984
47. TNA/DEFE/69/1438, Larken to VCNS, 28 September 1984
48. TNA/DEFE/69/1327, Hoddinott to ND Plans, 20 July 1984
49. TNA/DEFE/68/1483, Draft from DUS(P) to TNWPSG, 16 November 1984

outbreak of hostilities to deterioration had not been thought through and whole system costs had not been studied in detail.

Further work was conducted into three areas: the reduction of radar and other signatures of a stealthy cruise missile; a detailed examination of the characteristics and performance of a boosted bomb; a study of the potential of developing Sea Eagle, and the problems of fitting a nuclear warhead to Harpoon.[50] The Navy also wanted to consider options which promised to make the most significant and cost effective contribution to deterrence, weapons characteristics as related to deterrence, whole systems costs, the possible purchase of US systems; air launched ballistic missiles (ALBM); ground launched ballistic missiles (GLBM), subsonic cruise missiles (CM), including various degrees of stealth and relevant launch platforms. RAE drew up a plan that would see it continue work into these areas throughout 1985 and into 1986.[51]

Extending the life of WE-177

Given the failure to define the rationale, and because AWRE was expected to be occupied with manufacturing the 'Holbrook' warheads for Trident until 1996, and there was insufficient capacity to manufacture warheads for the new system until the late 1990s, the TNWPSG recommended an extension to WE-177's service life. Technical assessments indicated that an extension for at least five years was feasible, at a cost of some degradation in terms of reliability which would not affect the deterrent value, or safety of the overall weapons. Under this new plan, the B weapon would phase out in 1991, the A between 1994 and 1997 and the C between 1998 and 2002.[52]

Extending the lifespan up to 30 years was also investigated, though deep refurbishment was undesirable on the grounds of cost and the inherent problem of maintaining outdated technology. Life extension was estimated to cost £66m at 1982/83 outturn within the LTC 83 period, with total costs of between £91m and 100M if the life of the entire WE-177 stockpile was extended to 25 years.[53] These projections were dependent upon satisfactory results from regular stock take inspections, and it was not possible to provide assurance of weapon life for more than two or three years ahead at any one time. The risk of technical failure, which called into question the reliability, effectiveness and safety of the weapons increased with age. No other British nuclear weapon had then been in service for more than 20 years.[54]

Narrowing the Options

The decision to extend the life of WE-177 went some way towards removing the sense of urgency which had previously existed. Over the next three and a half years extensive studies into delivery systems were conducted. A Theatre Nuclear Weapon Delivery Systems Study Group was established and tasked with undertaking a report on the various system options, with RAE conducting work on several delivery systems, including ground launched ballistic and cruise missiles (GLBM and GLCM), short

50. TNA/DEFE/68/1483, Note on the RAE Report On TNW Delivery Systems, 3 December 1984; This further report is also still classified: TNA/DEFE/71/1198, Royal Aircraft Establishment (RAE) 1985 report: (Future) Tactical Nuclear Weapon Delivery Systems; volumes 1 to 9, 17 June 1985; TNA/DEFE/71/1197, Royal Aircraft Establishment (RAE) 1986 report: (Future) Tactical Nuclear Weapon Delivery Systems, 31 March 1986

51. TNA/DEFE/69/1438, Note on the RAE Report on TNW Delivery Systems, 3 December 1984

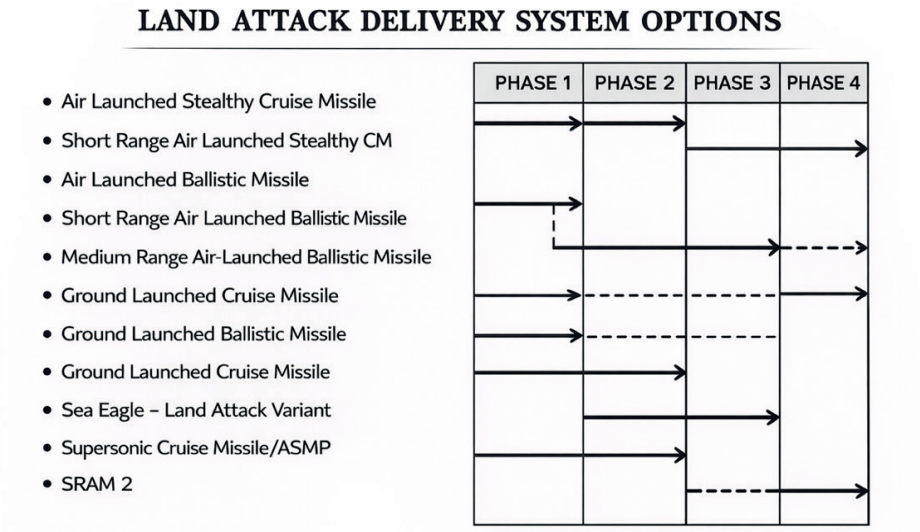
52. TNA/DEFE/69/1307, DUS(P) to SECCOS 11 August 1983

53. TNA/DEFE/72/302, TNWPSG(80)1, Theatre Nuclear Weapons Policy Steering Group, Study of UK Theatre Nuclear Weapons, Note by the Secretariat, 24 June 1980; TNA/DEFE/69/1307, Annex B to DN Plans 34/2, 28 June 1983; Technical assessments indicated that an extension of at least five years was feasible for all WE177 weapons, at a cost of some degradation in reliability which would not affect the deterrent value, or safety of the overall weapons. It was determined that deep refurbishment to extend the life of the weapons by more than a decade was unfeasible on the grounds of cost and the undesirability of maintaining outdated technology. Life extension was estimated to cost £66m at 1982/83 outturn within the LTC 83 period, with total costs of between £91m and 100M if the life of the entire WE177 stockpile was extended to 25 years.

54. TNA/DEFE/69/1307, Report on TNWPSG Meeting – 10 June 1984

range air launched ballistic (SRALBM) and longer range stealthy cruise missiles (ALSCM); a medium range ALBM, known as MRALBM, an adaption of the Sea Eagle air-to-surface missile (ASM), a derivative of LRSOM and the US Tomahawk ship/submarine launched cruise missile (SLCM) were also considered, along with relevant launch platforms, as well as their cost effectiveness and whole systems costs.[55] As the studies progressed it became clear that Sea Eagle required considerable modifications to meet the nuclear role and its age and poor penetrability counted against it and it was discarded in March 1986. Penetration prospects for ballistic and cruise missile options were better, but the crucial factor in the case of the cruise missile was its radar signature.

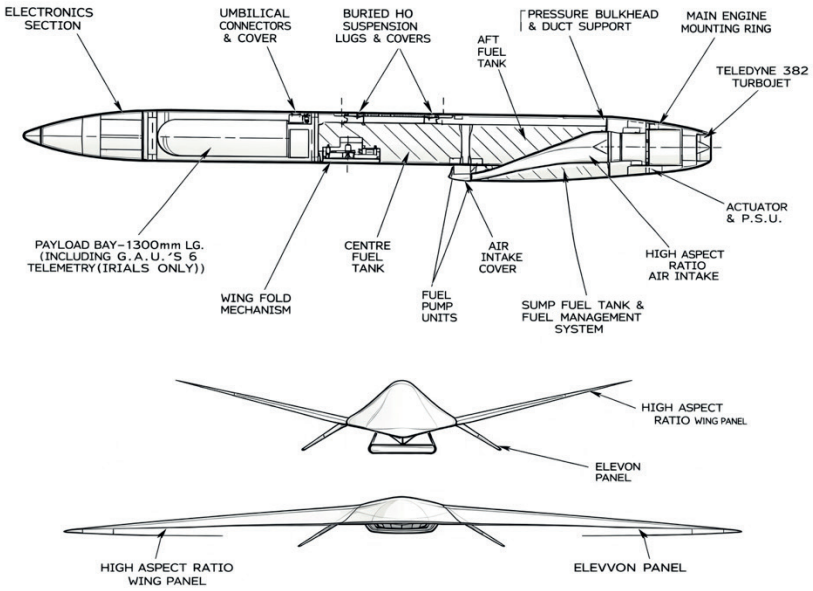
RP675 Studies conducted by the Special Weapons Department RAE Farnborough between 1 November 1983 to March 1987



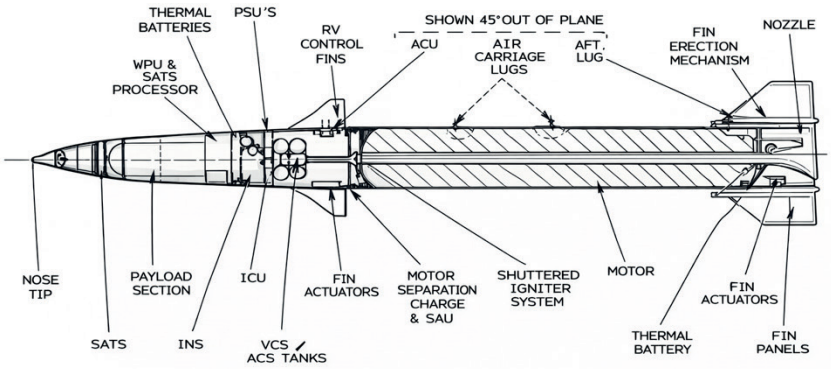
During Phase 4 the TNWPSG concluded that a stand-off range of the order of 400km was appropriate. A proposed cruise missile (ALSCM) was reconfigured and the design simplified as a result, but the ballistic option (MRALBM) was considerably more complicated than the short-range version in terms of its guidance system and initialization from the launch aircraft. A terminal guidance system was required to achieve acceptable accuracy, and to give some capability against ships, all of which increased the technical risks. By 1986 the ballistic missile and cruise missile options technically had equal standing: penetrability of the ballistic missile was comparable with the cruise missile, but the operational range was much shorter. Two purely national solutions emerged as the leading contenders: a Short Range Air Launched Stealthy Cruise Missile (SRALSCM) and a Medium Range Air Launched Ballistic Missile (MRALBM), though it was apparent that considerable technical risk and costs were involved with producing either solution and meeting the projected in-service date was difficult.

55. TNA/DEFE/68/1483, Note on the RAE Report On TNW Delivery Systems, 3 December 1984; This further report is also still classified: TNA/DEFE/71/1198, Royal Aircraft Establishment (RAE) 1985 report: (Future) Tactical Nuclear Weapon Delivery Systems; volumes 1 to 9, 17 June 1985; TNA/DEFE/71/1197, Royal Aircraft Establishment (RAE) 1986 report: (Future) Tactical Nuclear Weapon Delivery Systems, 31 March 1986. TNA/DEFE/69/1438, Note on the RAE Report on TNW Delivery Systems, 3 December 1984; TNA/DEFE/678, Minutes of the Seventh Meeting of the TNW Delivery Systems Steering Group, Held on 11 December 1986

Proposed Short Range Air Launched Stealthy Cruise Missile (SRALSCM)



Proposed Medium Range Air Launched Ballistic Missile (MRALBM)



The Tactical Nuclear Weapons Steering Group Final Report

The Steering Group took over three years to produce its final report. Its members still 'found it difficult to reach a consensus on the operational requirements for a British Theatre Nuclear Weapon system and the hardware alternatives which might meet this.' [56] To add to the difficulties the work was also undertaken in 'something of a budgetary void' and presented a number of options, some of which involved a total procurement cost – delivery system plus warhead – of up to £3 billion, and there was no discussion of the possible implications of procurement on the rest of the defence budget. However, wider developments reinforced the case for a successor system.

In July 1984, the JIC completed a report on the criteria for the UK national nuclear deterrent in the period 1995-2020, which assessed that, 'on balance there was a case for having a separate nuclear option to strike Soviet territory or forces at a level lower than the strategic' and that 'the possession of some lower level but nevertheless militarily significant capability is an essential element in the minimum deterrent package"'. However, when Ministers in MISC 7, the Ministerial Committee on Nuclear Defence Policy, approved the report in July 1984, because they were primarily concerned with defining the requirement of warheads and missiles for the strategic Trident system, they 'did not consider in any detail what particular form of lower level capability might be required, or for what potential missions.'[57] Second, in 1985, NATO's Supreme Allied Commander Europe (SACEUR) called on the UK to develop a nuclear air-to-surface missile with a stand-off range of 400km to replace the WE1-77 by 1995 and to assign 147 weapons to his Command. The same recommendation was directed at the US.

By the beginning of 1986, although the TNWPSG still 'found it difficult to reach a consensus on the operational requirements … and the hardware alternatives which might meet this', the CDS was 'convinced that something needs to be said to Ministers at this juncture.'[58] As drafts of yet another paper circulated around the MOD, there were complaints that the rationale was still 'less than fully convincing, not least given the enormous (and as yet unresolved) difficulties of accommodating such a costly project within the defence programme' and there were calls for 'a more balanced summary of the arguments for and against retaining this capability.'[59]

However, by July, 'After very considerable debate within the

56. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986

57. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986

58. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986; TNA/FCO/46/5340, Goodall Minute, British Theatre Nuclear Weapon Successor System, 16 July 1986; TNA/DEFE/25/678, Fewtrell to PS/PUS, 11 July 1986

59. TNA/DEFE/25/678; TNA/DEFE/71/1286, Hambleton to ACDS OR(AIR), 15 April 1988

Department, a consensus emerged which strongly supported the case for developing a follow-on system', and on 15 July the TNWPSG submitted its final report.[60] It identified three basic reasons why the UK should replace its sub-strategic system.[61] The first was to underpin the national strategic deterrent. The group concluded that the UK's deterrence posture was enhanced by the possession of a range of nuclear options, without which the Government would have had to rely on a strategic weapon of last resort, the threatened use of which in certain circumstances would not be credible – it was important not to put political decision makers in an all-or nothing situation in a crisis. Second, the Group concluded that it was important for the UK to retain the UK independent sub-strategic contribution to NATO, both to help bind the US into the defence of Europe and to complicate the Soviet assessment of likely Alliance reactions in a crisis. Finally, the Group concluded that it was important to possess a capability to deter nations outside of the NATO area which would acquire a nuclear a weapon at some future date, but without the need to rely on Trident which, under certain circumstances, could appear incredible or be inappropriate.

In terms of capabilities, the Group concluded that to support the strategic deterrent, the sub-strategic force should be capable of signalling a political preparedness to escalate, but that it was important that it should not be perceived as one of strategic capability. However, if the force was to be credible, it had to be capable of striking a militarily significant blow against Soviet forces threatening the UK or UK interests, and that it must be able to hold at risk targets in the Soviet Union to deny the Soviet Government a sanctuary from which to continue its aggression. Given the wide range of possible targets, the group preferred a single weapon system which could hold all selected target categories equally at risk. However, this requirement proved impossible to meet and the Group had to look for a weapon system which was effective against a category of targets considered the most important while still offering some capability against targets of lesser priority. The Group concluded that a capability against fixed land targets in Eastern Europe, including the USSR, should be accorded priority, while mobile land, mobile sea-surface and out-of-area targets, in that order, should be considered as subordinate target options. A replacement depth charge would have to be developed afterwards due to lack of resources.

In terms of system options, the Group concluded that given the envisaged operational environment in the 21st century, it was unrealistic to expect a free-fall bomb to provide an adequate replacement. For this reason, the Group agreed with the Delivery Group's recommended stand-off weapon systems and concluded that a medium range (350 km) air launched ballistic or a stealthy cruise missile (up to 1000 km) came closest to meeting the requirement.[62] RAF Tornado was envisaged as the main launch platform, though adapting the RAF's Nimrod Maritime Patrol Aircraft was a possibility. The Group assumed that the stockpile of replacement weapons would be similar in size to the existing holding,

60. TNA/DEFE/25/678, Fewtrell to PS/PUS, 11 July 1986; TNA/DEFE/25/678, United Kingdom Theatre Nuclear Weapon Successor System, Report on the Findings of the Theatre Nuclear Weapon Steering Group,

61. See Annex II

62. TNA/DEFE/25/678, United Kingdom Theatre Nuclear Weapon Successor System, Report on the Findings of the Theatre Nuclear Weapon Steering Group

some 230 weapons, excluding depth charges. It also concluded that costs were likely to be very considerable, with a new system, with warheads, estimated to cost between £3-4 billion, with an in-service date of around the turn of the century. The Group also highlighted the political and international arms control implications of adopting a new system. Any decision to proceed would likely attract widespread public interest and quickly excite controversy with criticisms focusing on cost (a further £3-4 billion to justify the £10 billion spent on Trident) and the enhanced capabilities. If the system could strike the Soviet Union, considerable arms control implications could occur. All three rationales were expected to be difficult to explain in public. Of the three, the third was difficult to use, and had implications for non-proliferation. The second would run into problems of credibility, and the underpinning of Trident would leave the Government open to criticism from opposition groups that the proposals amounted to an extra £2-3bn to make Trident credible.

Foreign Office officials were not impressed with the report's conclusions, particularly the assertion that '"the logic of NATO policy can also be followed nationally."' One Foreign Office civil servant described this as 'a thoroughly misguided notion' because 'The adoption of a mirror image of NATO's capability might make sense in terms of a European nuclear force, capable of providing a general nuclear umbrella for the defence of all Western European territory. But it has little logic when applied to the defence of the UK alone.[63] Foreign Office officials were also critical of the report's assertion that it was essential that any system had the capability to strike Soviet territory.[64] Nor were they impressed with the out of area rationale, which was described as 'a marginal if not fanciful factor in our thinking.'[65] Officials thought it was 'bizarre' that bi-lateral collaboration had hardly been mentioned given the 'obvious political, as well as practical, reasons for not ruling this avenue out… There are a small number of possibilities, including direct purchase of an existing missile or joint development of a new system.'[66]

The views of the Chiefs of Staff

When the Chiefs of Staff considered the Group's report they 'expressed some doubts about various individual elements in the rationale' but 'considered that overall a convincing case had been made in strategic/deterrent terms for a replacement', though they ascribed the most weight to the NATO requirement, 'rather than the need to "underpin" the national strategic deterrent'.[67] They 'recognised that some of the most important supporting arguments… were dependent on judgements, which were inevitably subjective, on how best to influence the perceptions of other countries.'[68] They debated the need to have a weapon with the capability to strike the Soviet Union, but were unable to agree and decided not to rule it out even though further studies might force such a conclusion on the grounds of cost and rationale.

As for system options, the Chiefs endorsed the Group's decision to rule out Sea Eagle and agreed that apart from an off the shelf purchase

63. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986
64. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986
65. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986
66. TNA/FCO/46/5340, Lever to Daunt, 9 July 1986
67. TNA/FCO/46/5340, Goodall to Private Secretary, 16 July 1986
68. TNA/DEFE/25/678, CDS to Younger, 20 September 1986

from the US, the choice lay between developing an entirely new cruise or ballistic missile or adapting the projected Long Range Stand Off Missile (LRSOM) for the nuclear role. They judged that the first course was likely to produce a satisfactory weapon, although at considerable cost, while the second, although more affordable, might not provide in full the required capability, especially if the system was to cover targets within the USSR.

But the Chiefs were 'horrified' at the £3 billion estimate, especially as history demonstrated that 'preliminary estimates invariably turned out to be under-estimates'.[69] They were uncertain at how to include the project in the MOD's Long-Term Costings, but agreed that LTC 87 'should try to reflect the very tentative figures'.[70] Given the estimated costs, the CDS Staff 'strongly advocated a joint project with the US if at all possible, not least on cost grounds, even if the result might not be ideal', and the possibility of collaborating with the French 'was noted without comment'.[71] Given the political and financial difficulties the Chiefs, and with a General Election due in 1987, the Chiefs were under no 'illusions about the likelihood of Ministers wanting to take a definitive decision either way this side of a general election.'[72] They were also conscious that it was not the function of the TNWPSG to pre-empt the normal MOD procurement process of programme management, and it was argued that it was important that the TNWPSG and, by extension, the Chiefs of Staff or Ministers, did not pre-empt the deliberations of the EPC(N).[73] As a result, the Chiefs asked the Defence Secretary to approve 'further pre-feasibility work, including a programme of studies… for up to 2 more years to refine the possible procurement options and their costs, including a US purchase and a LRSOM conversion' to provide the necessary data to enable a decision to be made at some point in 1987 whether the project could be accommodated within the defence programme.[74]

69. TNA/FCO/46/5340, Goodall to Private Secretary, 16 July 1986
70. TNA/FCO/46/5340, Goodall to Private Secretary, 16 July 1986
71. TNA/FCO/46/5340, Goodall to Private Secretary, 16 July 1986
72. TNA/DEFE/25/678, CDS to Younger, 20 September 1986; TNA/FCO/46/5340, Goodall to Private Secretary, 16 July 1986
73. TNA/DEFE/25/678, Kenworthy to D Nuc Pol/Sy, 25 April 1986
74. TNA/DEFE/25/678, CDS to Younger, 20 September 1986; TNA/DEFE/25/678, CDS to Secretary of State, 22 September 1986

Further Pre-Feasibility Work

Given MISC 7's directive regarding costs and collaborative/off-the-shelf projects, work on a purely national solution to the requirement, in the form of the air launched stealthy cruise missile (ALSCM) and the medium range air-launched ballistic missile (MRALBM) was placed in 'abeyance until a possible off-the-shelf purchase or a collaborative programme which meets the ST(SA) [Staff Target (Ship Air)] has been identified, and full life cycle costs of all options have been compared on an equal basis'.[75] The MOD looked to three possible solutions: collaboration with international partners, collaboration with the US and collaboration with the French.[76]

One possible means of international collaboration was the Modular Stand-Off Weapon (MSOW), a collaborative venture between the UK, US, France, Canada, Italy and Spain to produce a delivery vehicle capable of carrying a range of conventional munitions, which was under consideration to meet a UK requirement, SR(A) 1236. However, there was no assurance that MSOW would go ahead, and developing a nuclear version of the missile involved complex international issues as all parties would have to agree to allow the UK to use programme information for non-MSOW purposes.

The United States Air Force also had a requirement for a Tactical Air-to-Surface Missile (TASM), to enter service in 1995, and considered adapting several existing vehicles as delivery systems. These included a shortened and modified version of the Tomahawk cruise missile for carriage by a tactical aircraft, though this had not been developed; a Stand-Off Land Attack Missile; an adaption of the Harpoon missile for a conventional, land attack role; a Supersonic Low Altitude Target (SLAT); and the Short-Range Attack Missile (SRAM) II.[77] US Department of Defense assessments indicated that an adaption of SRAM II, known as SRAM-T was the only missile system capable of meeting the required in-service date.[78]

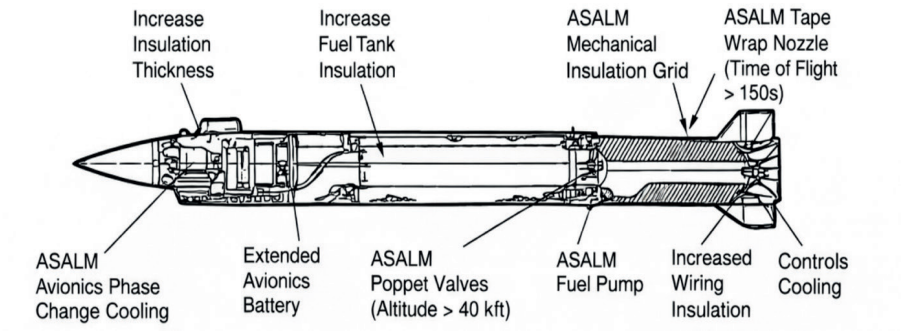
75. TNA/DEFE/71/1286, Ministry of Defence Equipment Policy Committee, ST(SA)1244 Future Theatre Nuclear Weapon (Paper by the Policy and Nuclear Department), 7 April 1988

76. TNA/DEFE/25/678, Minutes of the Seventh Meeting of the TNW Delivery Systems Steering Group, Held on 11 December 1986; Objectives included the refinement of missile designs, modelling, Radar Cross Section measurements, aero thermal tests, defining areas of high technical risks, determining whole life costs, concluding with the refinement of a Staff Target.

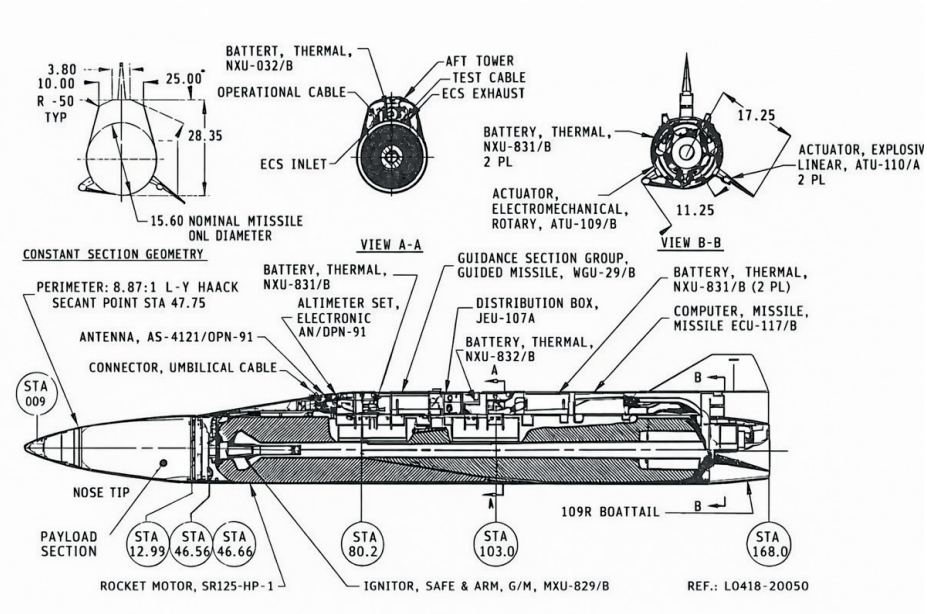
77. TNA/DEFE/71/1286, Ministry of Defence Equipment Policy Committee, ST(SA)1244 Future Theatre Nuclear Weapon, 7 April 1988; The Supersonic Low Altitude Target (SLAT) was a derivative of the US Navy's low flying target which was designed for external carriage on high sped aircraft. Developed by Martin Marietta, it was derived from a nuclear weapon which was under development for the US B1 aircraft, both of which were cancelled. Powered by rocket/ramjet systems capable of sustaining very high speeds and penetrating all forecast defences, SLAT had a range of 518km for low level launch and 696km for high level launch (extendable with a simple modification to carry more fuel up to 801kmand 959km respectively). Although SLAT and its predecessor had flown successfully, the USAF rejected it as it could not meet the required in-service date of 1995 and would have been more expensive than SRAM-T. TNA/DEFE/72/666, Witney to PS/S of S, 11 October 1990

78. TNA/DEFE/72/666, Witney to PS/S of S, 11 October 1990

Martin Marietta SLAT/TIRRM



The US Short-Range Attack Missile (SRAM) II

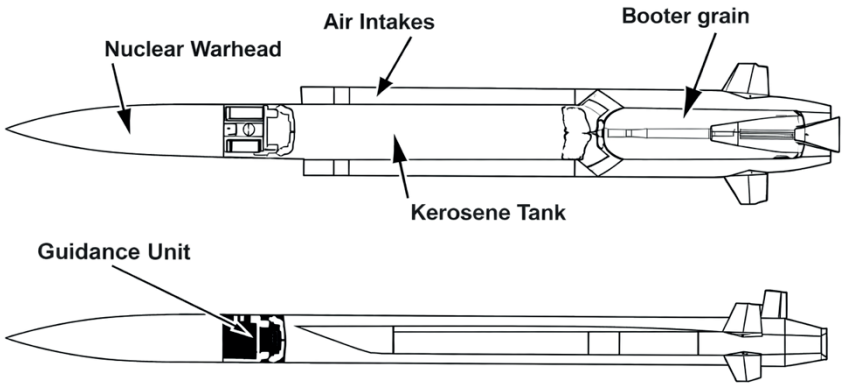


Cold War Factors

On 11 and 12 October, Ronald Regan, the President of the United States, and Mikhail Gorbachev, the General Secretary of the Central Committee of the Communist Party of the Soviet Union, met for a pre-summit at Reykjavik, Iceland, and almost agreed to eliminate offensive ballistic missiles and ultimately, all nuclear weapons. The fact that the US President had almost agreed to a wide-ranging treaty without consultation with allies sent shockwaves across the NATO alliance. Margaret Thatcher, the Prime Minister, was horrified. In France, Europe's other nuclear power also understood the implications. Discussions about Anglo-French defence and nuclear collaboration had been underway for some time, but after Reykjavik the French attempted to exploit British loss of confidence in Washington and put forward several radical collaborative proposals. In 1986, a new nuclear armed cruise missile, the Air-Sol Moyenne Portee (ASMP), entered service with the French Air Force. In April 1987, Jacques

Chirac, the French Prime Minister suggested to Thatcher that 'It would be an excellent idea were the United Kingdom acquire the missile for its Tornado' and 'He hoped that the Prime Minister would reflect further with a view to accepting the French proposal.'[79]

Air-Sol Moyenne Portee (ASMP)



On 11 June, the Conservatives returned to Government with a majority of 102, the second largest majority since 1945, removing one of the major political obstacles to proceeding with the programme.[80] On 8 December 1987, the US and the Soviet Union signed the Intermediate Range Nuclear Forces (INF) Treaty, which abolished US and Soviet ground launched missiles with a range of 500-5,000 km. In the aftermath of the Treaty, NATO restructuring of sub-strategic nuclear weapons following the INF agreement 'increased the importance of the air-to-surface missile.'[81] With the loss of an entire class of nuclear cruise missiles, increased emphasis was placed on Dual Capable Aircraft, and there was an expectation that the number of aircraft, and air-launched sub-strategic capabilities might increase post-INF, along with the necessity to bring an air-launched missile into service to replace free-fall bombs. There was also pressure from within NATO to increase the range of the missile to above 400km given advances in Warsaw Pact defences.[82] However, budgetary constraints in the MOD also caused difficulties. In the autumn of 1987, the TNWPSG carried out a re-evaluation of its earlier work 'in light of arms control developments and increasing pressure on the Defence Budget.'[83] The TNWPSG confirmed 'that a successor to the free fall bomb was required, and that an air-launched stand-off missile would best meet the UK's requirements.'[84]

When MISC 7 met in November 1987, Ministers concluded that modernization was still important to the continued effectiveness of NATO's strategy of flexible response and that replacement carried higher priority than acquiring a follow on to Lance, a sub-strategic nuclear surface to surface missile, which also required replacement. The Committee noted that the cost would be high and asked for the weapon specification to prioritise keeping costs to a minimum and that because 'a successor UK TNW development would carry serious financial implications', the MOD

79. TNA/PREM/19/3347, Prime Minister's meeting with M. Chirac, Chequers, 26 April 1987, Defence and Nuclear Matters
80. See Buter and Kavanagh, *The British General Election of 1987*, p.265
81. TNA/DEFE/71/1286, Ministry of Defence Equipment Policy Committee, ST(SA)1244 Future Theatre Nuclear Weapon (Paper by the Policy and Nuclear Department), 7 April 1988
82. TNA/DEFE/71/1286, Ministry of Defence Equipment Policy Committee, ST(SA)1244 Future Theatre Nuclear Weapon (Paper by the Policy and Nuclear Department), 7 April 1988
83. TNA/DEFE/25/678, Howe to PSO/CDS, 29 June 1987; TNA/DEFE/72/455, Background Note, u/d (February 1988)
84. TNA/DEFE/72/455, Background Note, u/d (February 1988)

should 'seek a collaborative approach to the procurement of a delivery system, specifically US/UK/France.'[85] Ministers indicated that before final decisions were taken it was 'essential that a clear assurance is given that the system in question is technically feasible and will be available within the prescribed timetable.'[86]

To enable the formal Feasibility Study to commence a formal Staff Target for what was now termed the Future Theatre Nuclear Weapon (FTNW) was defined by a FTNW Definition Committee.[87] In June 1988, the MOD's Equipment Policy Committee concluded that there was little prospect of completing the studies in time unless the number of delivery system and warhead options under consideration was reduced to no more than two or three and the number of the number of system options under consideration was reduced without any thorough analysis. The Modular Stand Off Weapon (MSOW) was dropped because it had no stealth characteristics and converting it to carry a nuclear warhead would have created difficult political problems with the other nations involved in its development. The modified Tomahawk cruise missile was also discarded because the US had at that point shown no interest in the modified system and the prospects of its development were slim.[88] Controversially the French ASMP was also dropped from further evaluation due to doubts about its performance, specifically its range and accuracy, and the complications involved in exchanging warhead design information with France.[89] On 8 June 1988, the Staff Target (SA)1244 for a Future Theatre Nuclear Weapons (FTNW) was endorsed by the EPC(N), and approved by the Minister (DP) on 4 August 1988.

Warhead Feasibility Studies

Payload Feasibility Studies commenced in September 1988.[90] A Memoranda of Understanding to allow access to US technology and vehicle design information, principally about the interfaces between the warhead and delivery vehicle, was negotiated in December 1998, to allow the US to provide 'detailed answers to a number of programmatic and technical questions', and host 'a major visit by both air vehicle and warhead feasibility study teams.'[91] The Warhead Feasibility Studies considered three approaches for a UK produced warhead, all of which used the US developed electronics for the US SRAM(T) missile. The first approach involved using the Trident physics package, but this was considered 'technically inadequate in many respects, particularly safety and the need for two warheads of different yields.' The second option involved UK manufacture of the US-designed SRAM(T) physics package. However, again, this was 'considered unacceptable, as it would call into question the UK's capability to fulfil its obligations under the 1958 Agreement.' It was essential for the UK to maintain credibility as a nuclear power by demonstrating the ability to produce a warhead. The third option involved a UK designed and manufactured physics package. This was the preferred option.[92] Overall the Warhead Feasibility Studies confirmed that an in-service date of 2001 was achievable, assuming the start of a two-year

85. TNA/PREM/19/3980, Prime Minister's Meeting with Mr Carlucci, Brief by the Ministry of Defence, 30 November 1987
86. TNA/PREM/19/3980, Prime Minister's Meeting with Mr Carlucci, Brief by the Ministry of Defence, 30 November 1987; TNA/PREM/19/3980, Prime Minister's Meeting with the United States Defense Secretary, 2 December 1987
87. TNA/DEFE/71/1286, Hambleton to ACDS OR(AIR), 15 April 1988
88. TNA/PREM/19/2616, Younger to Thatcher, 24 June 1988
89. TNA/PREM/19/2616, Powell's handwritten note on Younger to Thatcher, 24 June 1988
90. The warhead and its ancillary equipment
91. TNA/DEFE/13/2831, CSA to Secretary of State, 10 February 1989
92. TNA/DEFE/72/666, CSA to PS/Sec of State, 11 December 1989

PD phase in April 1991, Design Chill in March 1993, followed by three underground nuclear tests in March 1995, September 1996 and September 1997. The Design Freeze (commit to production) was scheduled for early 1998 with production commencing in 1998 and ending in 2001 coincident with completion of Approvals testing and release to service.[93]

Vehicle Feasibility Studies

The vehicle studies did not start until January 1989. A new MOU on data exchange to support the delivery vehicle studies was required, and the Treasury had to be satisfied about the detail of expenditure for the pre-FS studies before it granted financial approval.[94] The studies revealed that both SRAM T and SLAT were feasible delivery vehicles capable of meeting the in-service date of 2000. However, there were marked differences between them. SRAM T fell short of the requirement in several respects and there were aircraft integration problems with Tornado which had the potential to add significantly to final costs. However, as the USAF was expected to procure SRAM II and SRAM T, estimated unit production costs were lower. SLAT – which was now known as the Tactical Integrated Rocket Ramjet Missile, TIRRM – had the potential to meet UK requirements, but it needed substantial development work, as the US did not intend to use the weapon as a tactical nuclear delivery system.[95] Overall, the assessment of the two US systems was more complex than originally anticipated, and further work was required on aircraft integration and possible modification. Additional funding of £1.75m was committed to enable this work.

To add to the difficulties the French expressed considerable disappointment at the decision to focus the Feasibility Studies on the two US systems.[96] They offered to examine 'stretching' ASMP, to create a new missile, the so called ASMP II, or as it was otherwise known the Sub-strategic Air-to-Surface missile (SASM). However, they themselves had no requirement for such a weapon, which would have involved research, development and cost, for only a modest increase in range, the end result of which would still probably have fallen short of UK requirements.[97] As a result, Younger 'encouraged discussions with the French on their ideas for a successor' missile, known as the Air Sol Longue Portee (ASLP).[98] However, this new missile was only at the concept stage, and its projected in-service date was 2010, well beyond the timescale of British needs. Despite this, dialogue continued 'as a hedge against an adverse turn of events in the United States', as an 'insurance policy'.[99] In early July 1989, the French provided the UK with a briefing on their new proposals and the first detailed technical specifications of the ASMP II (SASM). A series of further discussions and technical exchanges then took place, and a feasibility study was conducted, to 'further permit the establishment of a baseline upon which subsequent collaboration between our two countries on a system of this kind could be founded.'[100]

Following exchanges of information, and visits by UK officials to the French state owned aerospace company, Aerospatiale, the French

93. TNA/DEFE/72/666, The Impact on the Warhead Programme of a Delay in Vehicle Selection for FTNW, 5 December 1990
94. TNA/DEFE/72/666, Controller Aircraft to CSA, 4 December 1989
95. TNA/DEFE/25/666, Feasibility Studies to ST(SA)1244 – The Way Forward, 4 December 1989; TNA/FCO/46/7271, MISC 7(89)7, The Modernisation of the United Kingdom's Theatre Nuclear Weapon Capabilities: Memorandum by The Defence Secretary, MISC 7 (89)7; While the Martin Marietta missile was referred to as SLAT, it was not a supersonic low altitude target. It was a 'SLAT derivative' or a 'tactical integral rocket ram-jet missile (TIRRM).
96. TNA/PREM/19/2616, Younger to Thatcher, 9 June 1988
97. TNA/PREM/19/2616, Younger to Thatcher, 9 June 1988
98. TNA/PREM/19/2616, Younger to Thatcher, 24 June 1988
99. TNA/DEFE/13/2881, Fewtrell to PS/SofS, 5 December 1988; TNA/PREM/19/3346, Anglo-French Summit, Paris 27 February 1989: Plenary Session; TNA/PREM/19/2616, Younger to Thatcher, 15 March 1989
100. TNA/DEFE/25/666, Younger to Chevenment, Draft, 8 November 1989

proposed another new missile, known as the Air Sol Moyenne Portee, ASLP-D2, a 'sophisticated development of the basic ASMP ramjet vehicle incorporating stealth techniques, with provision for guidance and offering longer range', 'which, on paper at least', met UK needs.[101] However, it was 'little more than a technology demonstrator', required 'extensive funding and maybe an input of UK know how', and its in-service date was uncertain.[102] Assessing the feasibility of mating the planned UK warhead, which was based on the US warhead for the SRAM-T to a French missile could only be pursued to a certain extent without involving the US in the exchange of sensitive information, such as the physical characteristics of the nuclear package and various aspects of the warhead/missile interface[103]

To assess ASLP-D2 it was necessary to undertake a detailed study of the ASMP Mk.II (SASM) and discussions were held with French officials to define the framework and management structure under which a Feasibility Study of their vehicles could take place. In December 1989, the EPC(N) authorized the extension of the Feasibility Studies to permit an expanded examination of the two French systems, which in turn delayed the completion of the full Feasibility study until the summer of 1990.[104] By this time the Atomic Weapons Establishment (AWE) had completed the payload studies, which established that a common vehicle to payload interface could be adopted for the two US systems and probably for SASM, enabling progress on the payload to continue in isolation from vehicle selection to preserve the in-service date, and the first projected underground nuclear test of the warhead in 1993. An exchange mechanism was eventually devised to allow the Feasibility Study of French vehicles to proceed in the form of a Government to Government Arrangement to permit the UK access to French design information (caveated for both commercial and security reasons) and to allow the French full access to the UK Staff Target, which was classified Secret.[105] US warhead 'envelope data' was also provided to the French to aid the study.[106]

Feasibility studies of the various system options continued throughout the summer and into the winter of 1989, by which time the Cold War was entering its final phase. Despite the turmoil in the Soviet Union, Soviet air defences continued to be enhanced. Even after the Treaty on Conventional Armed Forces in Europe (CFE) was concluded, the Soviet Union was expected to use both Airborne Warning and Control Systems (AWACS) and advanced Look Down/Shoot Down aircraft to provide effective defence in depth at all altitudes and engage targets well forward of the Soviet border. A range of modern Soviet surface to air missiles were also expected to pose a significant threat to launch aircraft, and in some cases the missile itself.[107] Studies into future Soviet/Russian air defences indicated that by 1997, the Tornado armed with WE-177, might suffer twice the expected attrition rate, which by 2003, could increase to as high as four to five times, leaving the Tornado/WE177 combination with only a 27% chance of launching a weapon against a representative target - and the increasing risk of the a component failure in WE-177 forcing the withdrawal of the weapon from service.[108]

101. TNA/DEFE/25/666, Feasibility Studies to ST(SA)1244 – The Way Forward, 4 December 1989; TNA/FCO/46/7271, MISC 7, 12 December: The Modernisation of the United Kingdom's Theatre Nuclear Weapon Capabilities: Memorandum by The Defence Secretary, MISC 7 (89)7
102. TNA/FCO/46/7271, MISC 7, 12 December: The Modernisation of the United Kingdom's Theatre Nuclear Weapon Capabilities: Memorandum by The Defence Secretary, MISC 7 (89)7
103. TNA/DEFE/25/786, Draft Minute from PUS to the Secretary of State, Anglo French Nuclear Cooperation, 9 March 1990
104. TNA/DEFE/72/666, Controller Aircraft to CSA, 4 December 1989
105. TNA/DEFE/25/666, Logan to PS/SofS, 22 December 1989
106. TNA/DEFE/25/666, Ridley to DC(Nuc), 24 April 1990
107. TNA/DEFE7/72/669, CSA to Secretary of State, SR(SA)1244 – Future Theatre Nuclear Weapon (FTNW), 2 November 1990
108. TNA/DEFE/25/812, Draft Progress Report From CA to CSA On SR(A)1244 Feasibility Studies and Risk Reduction, 5 November 1991

When MISC 7 had considered the new capability in 1986 Ministers approved a range requirement of 400km. At the time it was envisaged that the missile would largely be launched against targets in Non-Soviet Warsaw Pact countries. However, given the major political changes which took place in the Soviet Union and Eastern Europe throughout 1989 and 1990, including the reunification of Germany and the effective collapse of the Warsaw Pact, a greater premium was placed on hitting targets in the Soviet Union. Studies into the degree of standoff necessary to ensure a satisfactory probability of launch, and the rage required to give appropriate target coverage indicated that a range of 600km, not 400km, would both provide an adequate number of targets in the core Soviet republics and allow missiles to be launched far enough back to avoid unacceptable levels of attrition from air defences. In addition, concerns about US missile defence proposals and their possible impact on Trident, also led some to consider that 'it might be necessary to consider a range of 1200km' though this was 'too uncertain at present to affect the consideration of range requirements but the scope for extending the range… could be important.'[109]

109. TNA/DEFE/72/666, CSA to Secretary of State, SR(SA)1244 – Future Theatre Nuclear Weapon, October 1990

The Decision

The vehicle Feasibility Study concluded that TIRRM was the preferred vehicle option and should be taken forward into Product Definition stage. However, various political factors, such as arms control negotiations, deployment decisions by European countries, particularly Germany, and Anglo-French and Anglo-American considerations, had a significant bearing on decisions. On 18 October, the MOD's Procurement Committee concluded that there was very little separating the US TIRRM and French ASLP-D2.[110] SRAM(T) had a range which was well short of the required 600km, it was vulnerable, and the Tornado carrier aircraft required extensive modifications. However, it could enter service by the required in-service date, and with an estimated cost of £407m it was the cheapest of the three options. The US had also already chosen the missile to meet its own sub-strategic requirements in Europe and hoped that other European nations would accept it as a replacement for free fall bombs on Dual Capable Aircraft. However, by the end of 1990, the missile was experiencing funding problems in Congress, as well as technical development issues, including a catastrophic failure of a rocket motor under test.

The French ASLP-D2 had a low-level range of 760km and a high-level range of 980km. However, the French had no firm operational requirement and harmonisation with the British requirement was impossible.[111] The missile was deemed to be technically high risk and could only enter service in 2003-2005 (later revised to 2010) at an estimated cost of £847m, some £380m more than the LTC provision. Warhead integration was expected to be difficult because of the differences between the French missile and US warhead design.[112] The US TIRRM had a range of 518km for low level launch and 696km for high level launch, though both could be extended to 801km and 959km respectively with a simple modification to carry more fuel, but it could not meet the required in-service date. The missile design was judged to be considerably more mature than the ASLP-D2, and it could be developed to meet all other requirements, though with schedule and technical risk. Its cost was some £527m. TIRRM would be a solely UK venture and would meet the operational requirement and could be available by 2001-2002. However, it was high risk on both cost and timescale and could be caught by the Strategic Arms Reduction Treaty, (START), a bilateral US Soviet treaty which was signed on 31 July 1991.[113]

Given these factors, while the EPC(N) acknowledged TIRRM's advantages, it decided to postpone a final decision until the START treaty had been signed. To keep the programme moving it recommended a 24-month project definition phase for TIRRM at a total cost of £24.6m,

110. TNA/DEFE/72/666, Witney to PS/SofS, 11 October 1990
111. TNA/DEFE/25/812, CA to CDP, 13 May 1991, Annex
112. TNA/DEFE/72/666, CSA to PS/Sec of State, 11 December 1989
113. TNA/DEFE/72/666, CSA to PS/Sec of State, 11 December 1989

a 24 month project definition for aircraft integration, and a 24 month project definition and risk reduction phase for the AWE Prime option warhead design, and a commitment to the necessary risk reduction work to ensure continuity of progress into Full Scale Development, at a cost of £129.1m.[114]

A French Intervention

To complicate matters the French attempted to keep the ASLP-D2 option alive by offering 'the UK the French design of the nuclear warhead for the ASLP-D2 for production in the UK' as well as 'a co-operative warhead development', but only if the 'the UK reached a decision by the end of the year, since the whole approach was linked up to the French decision making of its future strategic systems.'[115] Despite doubts about the feasibility of the French proposal, in advance of a December meeting of GEN1, the Ministerial Committee on Nuclear Policy, the successor to MISC7, King requested 'a full assessment of the Anglo/French warhead option'.[116] It concluded that while 'Development of a closer nuclear relationship with France would be advantageous… collaboration with France on the FTNW warhead would constitute such a significant realignment of our nuclear efforts that it would carry unacceptable risk to our vital relationship with the US under the 1958 Agreement.' It recommended 'We should stick with UK manufacture of a UK design for the FTNW warhead, but regard the French option as one we might revert to later', and in the interim 'work at developing our interchanges with the French in the warhead area as far and as fast as financial constraints and the need to safeguard the American relationship allow.[117]

Yet Sir Richard Oxburgh, The Chief Scientific Adviser at the MOD, objected, and warned that 'In practical terms, it is simply not feasible to have detailed technical exchanges and to work collaboratively on the same topic with one nation, whilst at the same time excluding from one's thinking concepts derived from discussion with the other.' While it was possible to 'have a close technical relationship with the French on nuclear research', which would take time to develop, eventually, the UK was 'likely to reach a point at which we are faced with three choices:

a. Consciously decide to allow the French exchanges to go no further, and to continue work with the US
b. Decide to terminate the exchanges under the '58 Agreement and to throw our lot with France
c. Negotiate a trilateral agreement with US and France under which the three countries collaborate.[118]

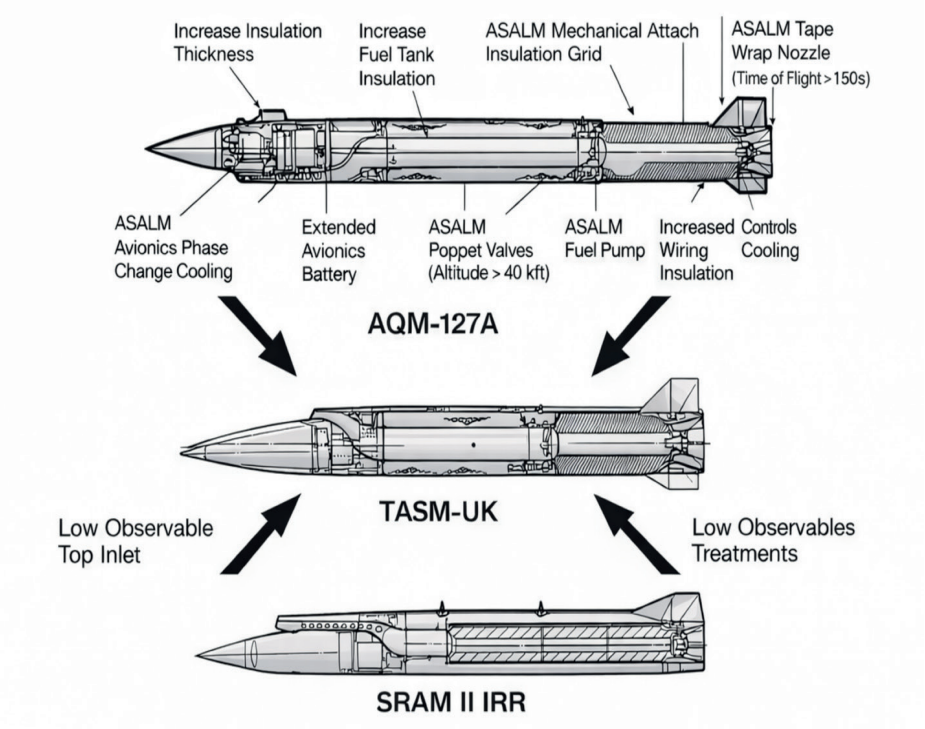
Given the complexity of the decisions confronting Ministers, the simplest solution was to once again delay. AWE concluded that 'the warhead programme can continue unaffected with the selection of the vehicle deferred for a period of 4 years (until 1995), providing the candidate vehicle fully meets the environmental and interface requirements which

114. TNA/DEFE/72/666, Note of Decisions Taken at EPC(N) 1st MTG/90, 18 October 1990
115. TNA/DEFE/72/666, Cooperation with France on FTNW Warhead, 29 November 1990; TNA/DEFE/72/666, Webb to PS/CDP, 24 October 1990
116. TNA/DEFE/72/666, CSA to PS/Secretary of State, 25 October 1990; TNA/PREM/19/3652, Webb to Powell, 26 October 1990; TNA/DEFE/72/666, McTaggart to ACDS(Pol/Nuc), 30 November 1990
117. TNA/DEFE/72/666, Cooperation with France on FTNW Warhead, 29 November 1990
118. TNA/DEFE/72/666, Burleigh to MA/ACDS(Pol/Nuc), 5 December 1990

will be specified for the warhead in April 1991.'[119] On 11 December, GEN 1 approved a two and half year programme of Project Definition and risk reduction on a UK 'warhead based on the US W91 warhead which was being developed for SRAM-T', and delayed the decision on the delivery vehicle.[120] The Prime Minister agreed and asked to revisit the selection process after signature of the START Agreement and at a convenient review point in the warhead programme.[121] As a result of this delay in 1991, AWE increased the forecast life expectancy of WE-177 to 28 years, and 30 years for planning purposes.[122] The In Service Date for the system was also postponed from 1995 to December2001.[123] The French were disappointed.[124] It then became apparent that developing a warhead in isolation from the delivery system intended to carry it was, 'difficult' and that in reality, "no decision needed for four years" in practice means "if we are content that the decision should be for SRAM-T".[125] Although there was a 'feeling that Ministers may not have fully grasped at December's GEN 1 the potential impact of deferred vehicle selection', Ministers were not asked to select the vehicle.[126]

By April 1991, what would have been the TASM missile, comprised of minor modifications from the SLAT/TIRRM missile, plus SRAM II Infrared Reflective (IRR) Stealth Features, started to take shape.

Minor SLAT Modifications Plus SRAM II IRR Stealth Features Equal TASM UK



The French suggested a number of cost saving measures to reduce the cost of ASLP-D2, and also proposed abandoning a collaborative development programme and simply buying direct from a French Prime

119. TNA/DEFE/72/666, The Impact on the Warhead Programme of a Delay In Vehicle Selection fo FTNW, 5 December 1990; TNA/DEFE/72/666, CSA to CDS, 10 December 1990
120. TNA/DEFE/72/666, CA to CSA, 11 January 1991; TNA/PREM/19/3225, Gass to Wall, 9 October 1991
121. TNA/DEFE/25/811, Gwilliams to Ryan, 11 February 1991
122. TNA/DEFE/25/812, Draft Letter From PS/S of S to PS No.10, 22 October 1991
123. TNA/DEFE/25/812, Morrison to D(Nuc)P, 2 July 1991
124. TNA/DEFE/72/666, Powell to Webb, 14 January 1991
125. TNA/25/811, Witney to ACDS (Pol&Nuc), 16 April 1991; TNA/DEFE/13/2761, Briefing Notes for the Secretary of State on Nuclear Matters from CSA; TNA/25/811, Witney to ACDS (Pol&Nuc), 16 April 1991
126. TNA/DEFE/25/811, Mottram to CDP, 15 March 1991

Contractor, to reduce costs by an estimated 16.5%.[127] However, the French 'played hard to get despite persistent efforts'. Aerospatiale 'refused to adopt as standard the reshaped nose essential for the integration of the UK payload', which was 'a serious issue and may well result in two different missiles with common sub-systems'.[128] By this time the programme was starting to unravel. In July 1991, the Navy withdrew its involvement.[129] The cost of SRAM-T and TIRMM also increased. Integration on Tornado was expected to be high risk; the US advised that extramural warhead production costs 'may be understated by some £100m' and the cost of Underground Nuclear Testing increased due to US cutbacks on its own testing programme.[130]

Then, in September 1991, the Russian Congress of People's Deputies voted for the dissolution of the Soviet Union. On 27 September 1991, the US announced vast reductions in the US nuclear arsenal, which included the cancellation of SRAM-T. The status of the US W-91 warhead programme was not immediately clear, though there were indications that 'limited funding will be available to keep it alive as an R&D programme.'[131] If it was cancelled 'a UK designed warhead would delay the programme by at least 4 years and would be several hundreds of millions more expensive', though it was possible that a new US warhead for the existing SRAM-A could be offered to the UK.[132] On 5 October the Russians responded with their own nuclear reductions. Two weeks later, on 17 and 18 October, NATO's Nuclear Planning Group agreed a new sub-strategic nuclear force posture and stockpile level which reflected the changed security environment in Europe, which resulted in a total reduction of NATO sub-strategic weapons of around 80%.[133] On 7 November 1991, NATO published a new Alliance Strategic Concept which modified 'the principle of flexible response to reflect a reduced reliance on nuclear weapons.'[134]

127. TNA/DEFE/25/812, CA to CDP, 13 May 1991
128. TNA/DEFE/25/812, Hambleton to ACDS(Pol&Nuc), 12 August 1991
129. TNA/DEFE/71/1303, Stern to ADNS(T-NW), 4 July 1991
130. TNA/DEFE/25/812, Morrison to Head of RP(P&B), 16 August 1991
131. TNA/DEFE/25/812, US Arms Control Initiative: implications for TASM, 9 October 1991
132. TNA/DEFE/25/812, File Note: verbal response to D Nuc Pol/Sy, 2 October 1991; TNA/DEFE/25/812, Amendments to attachment to DUS(P)/367/91/(205), 22 October 1991
133. TNADEFE/25/812, NATO Press Release M-NPG-2(91)75, 18 October 1991
134. NATO, The Alliance's New Strategic Concept, 8 November 1991

Trident in the sub-strategic role

Given the sweeping changes and the cost and complexity of the replacement programme, civil servants started to explore a new option to meet the UK sub-strategic nuclear requirement: using Trident, a strategic system, to fulfil the sub-strategic requirement. Trident was reliable, accurate and flexible and more than capable of delivering warheads onto targets within range. However, there were problems with using strategic system in a sub-strategic role. The first was the so-called discrimination problem. In circumstances involving Russia, Moscow would have to try and analyse UK intentions from the targets which were hit, as well as from UK Government or NATO communications of intent. Officials warned that 'Given the dangers inherent in misinterpretation, it would be most unfortunate to have to place so much reliance on a message getting through; being read by the right people; and being believed.'[135] They worried that 'using Trident in this way against the Soviet Union in the fog of war would probably precipitate rather than deter escalation, as well as jeopardize the rest of the boat load. It puts all our eggs in one basket. And against third world threat its use would be incredible (and therefore non-deterring) and even self-deterring.'[136] Concerns were raised about 'fratricide', ensuring "unnecessary" warheads burnt up on re-entry, possible radiation contamination, debris revealing 'many if not all of the warheads design features', limiting the Government's follow on-use options, the lack of flexibility in terms of targeting, communicating targeting information to submarines while on patrol in a jamming environment, SSBN detection, and the loss of a second SSBN should it be required to operate in a strategic role in the future.[137] It was also argued that combining all the UK nuclear capability in a single weapon system could risk the failure of the UK's entire nuclear arsenal.[138]

There were counter arguments to many of these criticisms. The Government could make a 'unambiguous authoritative declaration of a policy of using Trident to fulfil the sub-strategic requirement' to 'make clear both our resolve and commitment', while the Russians could be informed of the Government's decision to use Trident in sub-strategic role via diplomatic means, which was in line with UK Nuclear Weapon Release producers, which included the use of NATO's Communication of NATO's Intent procedure, which was designed specifically to achieve the objectives of first use of sub-strategic nuclear weapons while limiting the risk of uncontrolled escalation. As for criticisms about Trident's lack of flexibility, supporters pointed out that a database of possible sub-strategic targets could be loaded onto the submarine prior to departure, providing

135. TNA/DEFE/25/812, Buckley to DUS(P), 31 October 1991
136. TNA/DEFE/25/808, Gommershal to Wiltshire, 3 December 1991
137. TNA/DEFE/812, Beaven to Witney, 29 October 1991
138. TNA/DEFE/25/812, ACNS to DUS(P), 25 October 1991

the Government with the flexibility to select whichever targets it required in a crisis. While the difficulties of relaying data for an opportunity target were acknowledged, it was argued that it was 'difficult to imagine a sub-strategic target being selected in such a fashion.' Nor was it the case that SSBNs would have to sail with pre-configured missiles and re-entry bodies.

Supporters also countered the argument that Trident was vulnerable when it came to communications. As for the argument that a sub-strategic firing would expose the on patrol submarine, vulnerability studies had indicated that 'is would be difficult for the Soviets to deploy assets in sufficient numbers and sufficiently quickly to localize and prosecute an SSBN' and the UK Defence Intelligence Staff assessed that the Soviets had no land-based counter battery capability. It was also argued that an SSBN was less vulnerable than a Dual Capable Aircraft using a fixed runway, even allowing for dispersion and hardened aircraft shelters. As for the possibility of a future requirement for two submarines to fulfil the strategic deterrence criteria, supporters pointed out that it was 'possible that in time of tension 3 Trident boats could be at sea' and that the risk that combining all the UK nuclear capability into one weapon system was overstated, applied equally to the force of four submarines, and such concerns had 'not been borne out by history.'[139]

The chief proponent of many of these rebuttals was the Assistant Chief of the Naval Staff, who believed 'that FTNW is unaffordable when set against the associated risks of the TASM project and the overall constraints of the Defence budget.' He was worried if TASM was approved, 'The overall effect is likely to be a need to seek offsets from other important capabilities at a level which the programme could not sustain.' While he acknowledged the clear disadvantages to using Trident in the sub-strategic role, he argued that these were outweighed by one key advantage, 'value for money, of what is effectively a no cost solution, provided by a project on which the vast majority of funding has already been committed.'[140]

However, the rationale for TASM came under scrutiny. In the Foreign Office, Douglas Hogg, the Minister of State for Foreign Affairs was 'very skeptical about the need for TASM' and asked the MOD why 'could we not use Trident sub-strategically?' The MOD 'deployed the counterarguments', but Hogg 'was left unimpressed: these subtleties of nuclear theory and practice would be lost on his constituents who would instead focus on the size of the bill at a time when there was no threat.'[141] The FCO produced a series of Planners' papers designed to challenge existing policy. One, 'UK Security Policy, A Fresh Look At Deterrence & Non Proliferation', contained a full-on assault on TASM and concluded that as the Soviet conventional threat to Western Europe had 'all but disappeared, it is difficult to see a justification for sub-strategic nuclear weapons in Europe' and that 'the requirement, not to mention the affordability (cost approximately £1.5 billion) and implications for proliferation, for a new UK sub-strategic weapon, i.e. TASM, looks very weak.'[142] MPs also questioned why Trident could not be used.[143] 'The Bush initiative and the increasing signs of FCO doubt presage a difficult time for our FTNW plans', wrote the PUS at the

139. TNA/DEFE/25/812, ACNS to DUS(P), 25 October 1991
140. TNA/DEFE/25/812, ACNS to DUS(P), 25 October 1991
141. TNA/DEFE/25/808, Mottram to Head of DACU, 23 October 1991
142. TNA/DEFE/25/808, UK Security Policy, A Fresh Look At Deterrence & Non Proliferation, 25 November 1991
143. Col. 564, link

MOD.[144]

The MOD attempted to tailor the rationale to take account for the fact that the clear threat of major aggression by the Soviet Union no longer applied by arguing that a tactical capability was required 'to retain a capacity for credible first nuclear use both to hedge against a risk that a future Soviet state might recreate a massive conventional superiority because of a lack of willingness by the West to pay the price for maintaining conventional balance, and to avoid the possibility that total war could again be seen as a feasible military option'. The MOD also argued that the capability was required as an insurance against the risk that in the post-Cold War world, 'the credibility of a US extended nuclear guarantee may decline over time, should the US and Europe drift apart', and that in such circumstances 'Britain and France might need to take on more responsibility for the nuclear defence of at least the core of a future, deepened European Community/WEU.'[145]

Given the many complex issues associated with decision making around TASM, at the end of October 1991, King asked for a 'fresh look at the characteristics of a future sub-strategic force'.[146] When GEN 1 met in February 1992, King said that while it would be possible to make an initial comparison of the merits of two leading TASM missile systems, because their estimated costs exceeded the provision in the forward defence programme, he intended to examine alternative options, such as an updated WE177, a new free-fall bomb, the adaption of other missiles, and the use of Trident in a sub-strategic role.[147]

The end of nuclear testing

Meanwhile, the UK continued to conduct underground nuclear tests. In early December 1991, the UK conducted an underground nuclear test in Nevada, of a device intended for TASM, known as 'Sunbow Prime', under the codenamed 'Bristol'. This was the first of two tests of an entirely new warhead design, with enhanced safety features. Three additional tests to validate and certify the performance of the 'Sunbow' service warhead were also planned for 1995, 1996 and 1997.[148] But these plans were threatened by widespread calls for a ban on underground nuclear testing which intensified following the end of the Cold War. As international support for a Comprehensive Test Ban increased, the Government monitored its future testing programme 'to build up AWE's expertise and capability to cope with a testless world'; 'to achieve competence in the latest safety technologies and explore the scope for further advances'; and 'to consolidate modern safety features into the finished design of a new generation warhead.'[149] However, none of the tests were conducted. By the summer of 1993, both Russia and the US were observing a de facto moratorium on nuclear testing, and the UK was unable to test again.

144. TNA/DEFE/225/812, PUS to DUS(P), 11 October 1991
145. TNA/DEFE/25/812, Draft Letter From PS/S of S to PS No.10, 22 October 1991
146. TNA/DEFE/25/808, Webb to Mottram, 25 October 1991
147. TNA/PREM/19/4054, Rifkind to Major, 6 August 1992
148. TNA/DEFE/13/2826, SA – NIA Working Document, Undated
149. There has been some speculation that the first test was to be of a low-yield Trident warhead. This doesn't appear to be so.

Cancelling TASM

The prospect of an end to testing also had implications for the Government's sub-strategic nuclear capability. Although discussions with the French continued, and Paris made several concessions, attempts to harmonize requirements still proved difficult. Meanwhile, officials continued to grapple with the complex technical, political and geopolitical implications of using Trident to fulfil the sub-strategic requirement, and whether the 'advantages of maintaining an air-delivered sub-strategic capability will justify the costs involved.'[150] Studies continued into the summer of 1992. Updating Ministers in August, the new Defence Secretary Malcolm Rifkind explained that they had ' confirmed that Trident could fulfil the sub-strategic operational requirement' and that 'our present assessment, there is likely to be sufficient capacity in a 4 boat 16 missile Trident configuration to meet our sub-strategic as well as our strategic needs.' However, he warned that with only one nuclear system, 'If the Trident capability was compromised (eg by developments in ballistic missile defences or anti-submarine warfare techniques) or general technical defect, we would not have a fall-back, though one could be developed over a period of years' and there 'would be implications for our ability to participate in nuclear burden-sharing arrangements with Allies in Europe (which have in the past been thought to require systems based in Europe rather than off-shore).'.[151] Rifkind also highlighted that the question of a sub-strategic replacement was intertwined with questions about AWRE's ability to design and produce nuclear weapons and that 'we would have to preserve for the future our national capability to design and produce nuclear weapons even if the current assumption of WE177 replacement were changed', by, for example, 'capitalizing on this continuing expenditure to produce a minimal air-delivered capability (eg a new free-fall bomb) which, even though inadequate in itself for the full range of our sub-strategic needs, might give us a national independent fall-back.'[152]

Once again, the MOD attempted to delay and a submission was prepared for Ministers. However, at the beginning of March, Rifkind 'instructed' MOD officials to rewrite submission, 'in effect to propose abandonment of a TASM' and not to rely on a separate national sub strategic system…, but the versatility of Trident to provide both a strategic and sub strategic capability.'[153] During the 1992 Public Expenditure Survey, the series of bilateral negotiations between the Treasury and the MOD, the Treasury demanded further cuts to the Defence budget.[154] The MOD identified £1 billion of savings in an exercise known as 'Front Line First' and Rifkind concluded 'that a TASM is not affordable, given other even more pressing Defence priorities.'[155] While he continued to believe that a credible sub-strategic nuclear capability was 'essential to an effective nuclear deterrent', he now argued that there was an important 'distinction between the need for the capability, and the need for a separate system to embody it.'[156] This subtle, yet important shift in rationale allowed Rifkind, and those who supported cancelling TASM, to discard the various air-launched options. As such, the revised MOD paper argued that:

150. TNA/DEFE/13/2838, Witney to PS/SofS, 7 May 1992
151. TNA/DEFE/13/2836, Rifkind to Major, 6 August 1992
152. TNA/DEFE/13/2836, Rifkind to Major, 6 August 1992
153. TNA/PREM/19/4054, Neville-Jones to Lyne, 8 March 1993
154. Malcolm Rifkind, *Power and Pragmatism: The Memoirs of Malcolm Rifkind*, p.
155. TNA/CAB/148/362, OPD(N)2(93), The UK's Long-Term Sub-Strategic Nuclear Capability, 20 May 1993
156. TNA/CAB/148/362

A sub-strategic strike needs to be clearly different in scale and intention from a strategic attack, by being smaller in numbers and more limited in effect than our overall nuclear capability would allow, and by being accurately directed against identifiably non-strategic targets. Neither of these criteria necessarily requires that the strike be carried out by a weapon system different from the strategic deterrent.[157]

In the post-cold war strategic environment, and given the financial constraints, Trident offered a practical, low cost, middle way.[158] The revised MOD paper argued that the system was 'in many ways, well suited technically to the sub-strategic role', in that it was 'flexible, highly accurate', and could 'deliver a single warhead or limited salvoes virtually anywhere in the world from its normal operating area with high reliability (and with none of the staging and overflight problems that can inhibit the deployment of aircraft).'[159]

Implications

The MOD argued that Trident could meet the sub-strategic requirement at practically no additional cost and that further savings were possible if WE-177 was withdrawn from service as soon as Trident entered service in 1994. The department also concluded that a new low yield variant of the standard 'Holbrook' warhead could be produced at relatively low cost by converting the last production tranche of full yield warheads and that only a small amount of extra data processing was required to support targeting at a cost of around £0.5 million. Although the Government had decided to initially deploy each of the new 'Vanguard' class SSBNs with 12 missiles, the MOD retained the option of buying additional missiles to fill all sixteen tubes at the end of the US missile production run – the original plan involved increasing the number of missiles to 16 at the turn of the century.

The most pressing potential drawback to relying on Trident for the sub-strategic role was that it added to 'the risk that a sub-strategic strike might be misinterpreted as the beginning of an all-out attack or as an attempt to pre-empt the opponent's offensive forces or to decapitate its leadership, thereby triggering the escalation that sub-strategic use would be designed to avoid.' The MOD concluded that 'Against an opponent with no early warning system, this problem is unlikely to arise', a judgement that was probably accurate because such an adversary would be unable to detect an incoming strike until it was too late. But against Russia, or any other state that possessed an early warning system, this was a very real problem. The MOD acknowledged that the Russian doctrine of 'the concept of "retaliatory counter-strike" – an immediate launch of their missile forces as soon as an in-coming missile is detected', and the 'shortcomings of the Russian early warning system', which following the collapse of the Soviet Union had fallen into disrepair and was known to give false alarms, 'might exacerbate this risk', but the MOD simply stated that the Government 'might be able to influence Russian perceptions by what we said before and during any crisis.'

157. TNA/CAB/148/362, Annex B, Trident's Capability To Fulfil The Sub-Strategic Role, 20 May 1993
158. TNA/CAB/148/362, Annex B, Trident's Capability To Fulfil The Sub-Strategic Role, 20 May 1993
159. TNA/CAB/148/362, Annex B, Trident's Capability To Fulfil The Sub-Strategic Role, 20 May 1993

How a British Government would do this was not spelt out in any detail. The fact that a direct telephone line between London and Moscow existed, through which communication with the Kremlin could quickly be established and in a crisis used to convey a message that a strike was limited was likely relevant, though whether a Russian leader would believe or interpret the Government's intentions correctly is debatable. Rather, in the post-Cold War world, where relations with Russia were much improved, the MOD appears to have taken the view that such questions did not require immediate answers. However, during the Cold War, there was 'a view, supported it is understood by extensive US nuclear wargaming experience, that such usage stands a very high chance of misinterpretation, a notion' that the Soviet Union had been only too happy to 'do its utmost to promote.'

As for the survivability of the submarine, and the risk that an initial sub-strategic strike could expose the on-patrol firing submarine to detection and thus prevent it from fulfilling its strategic role, the MOD did 'not currently assess that this would be likely to render Trident boats vulnerable to counter-attack'. Rifkind was also confident he could safeguard the capability and competence of AWE and that the impact on the UK's allies could be managed. Committing Trident to SACEUR for sub-strategic as well as strategic purposes and 'aligning ourselves with other European burden-sharing allies by accepting US free-fall bombs for our Tornadoes under dual key arrangements when WE177 leaves service' could 'serve to deflect any immediate criticism' in NATO. But as Rifkind pointed out, none of these proposals would 'alter the reality that our decision will diminish the chances of indefinite survival of the current nuclear burden-sharing arrangements, and the important element of trans Atlantic solidarity within NATO that they represent.' Rifkind was confident that continuing to provide basing for US dual capable aircraft, keeping WE-177 in service into the early 21st century, and the fact that the UK, uniquely amongst NATO allies, provided strategic forces to SACEUR would go some way to reassuring those who argued that by cancelling TASM, the UK was undermining NATO policy. As for the French, Rifkind recommended the Government 'impress on the new French government our enthusiasm for developing the nuclear relationship in all other feasible and mutually beneficial aspects.'[160]

The Government waited until October 1993 to announce the cancellation. On 18 October, Rifkind informed the Commons that 'we have concluded that our previous requirement for a new standoff nuclear weapon capability is not a sufficiently high priority to justify the procurement of a new nuclear system', though he included an important caveat that 'we must also recognise that judgments of this nature about future circumstances must inevitably be provisional. We will keep all our requirements in this area under review in the light of international developments.'[161] He later explained that, 'We concluded that, because we could achieve the same sub-strategic deterrent with the use of Trident at virtually no additional cost to the defence budget, the TASM approach was

160. TNA/CAB/148/362, The UK's Long-Term Sub-Strategic Nuclear Capability, Memorandum by the Secretary of State for Defence, 20 May 1993; Malcolm Rifkind, 'UK Defence Strategy: A Continuing Role for Nuclear Weapons', Speech at Centre for Defence Studies, King's College London', 17 November 1993

161. Malcolm Rifkind, 'UK Defence Strategy: A Continuing Role for Nuclear Weapons', Speech at Centre for Defence Studies, King's College London', 17 November 1993

infinitely preferable to financing at well over £1 billion a new sub-strategic system to be carried by the Royal Air Force. As we could maintain the same sub-strategic capability with a much smaller burden on the defence budget, it made sense to go in that direction.'[162] TASM had become an extravagance. But the decision to rely on Trident was reached with 'genuine reluctance.' A great many questions also remained unanswered, and, as Sir David Omand later put it, 'In the end… we rationalised in our own minds reliance on the ballistic missile submarine as our deterrent.'[163] The Sub-Strategic Trident system entered service at some point in 1995. Continuous deployment was achieved following the entry into service of HMS *Victorious* in 1996.[164]

162. Hansard, HC Debates, Col.468, 4 May 1995
163. David Omand comments to Cabinets and the Bomb Workship, British Academy, 27 March 2007
164. Hansard, HC Debates, Col.1138, 22 February 1996

Conclusion

The WE-177 replacement programme suffered from a lack of a clear rationale, deferred decision making, inadequate funding, and a rapidly changing international strategic environment, which ultimately led to its cancellation. The decision to rely on Trident, a strategic system, to fulfil the UK's sub-strategic requirements was a pragmatic solution largely driven by the Government's desire to save money. Arguably it was appropriate for a world where the threat from the Soviet Union and Russia which had dominated the strategic landscape for over fifty years no longer applied. But in the twenty first century, with a resurgent Russia, a seemingly unreliable US ally, whether it is still appropriate is an open question.

Should the British Government decide that it once again requires a separate distinct and sovereign sub-strategic nuclear capability, there are many lessons from the WE-177 replacement programme that would still apply to any subsequent procurement programme.

Policy makers will need to consider the following:

First, whether the rationale articulated during and immediately after the Cold War remains relevant today? Is a UK sub strategic capability required to underpin the national strategic deterrent, to enhance the UK's overall deterrent posture by having a range of nuclear options; to provide an independent sub-strategic nuclear contribution to NATO, both to help lock the US into the defence of Europe and to complicate Russian assessment of likely Alliance reactions in a crisis; to have a capability to deter nations outside the NATO area which could acquire a nuclear weapon at a future date, but without the need to rely on Trident which, under certain circumstances, could appear incredible or be inappropriate; and to provide an insurance against the risk that the credibility of a US extended nuclear guarantee may decline over time, should the US and Europe drift apart and to provide a system which, alongside French nuclear systems, could contribute to the nuclear defence of Europe.

Second, the subject of sub-strategic nuclear weapons does not lend itself to categorical assertions, but rather to a series of judgements based on a variety of often conflicting considerations. There may be no absolute answers. Whether the UK requires a sub-strategic capability is likely to depend on an assessment of relative priorities.

Third, any study of a future British sub-strategic nuclear capability needs to consider whether a continued UK contribution to NATO's nuclear mission should necessarily be provided by nationally owned weapons or whether US provided dual key systems suffice. Dual key systems are likely to be a more economical method of contributing to NATO's nuclear

capability and of indicating to Russia and NATO allies a continuing commitment to the Alliance and its nuclear posture.

Fourth, any study of a future British sub-strategic nuclear capability needs to determine whether a sub-strategic nuclear capability is primarily required for deterrence/political signaling purposes, warfighting, or both. The answer will influence decisions about delivery systems.

Fifth, the WE-177 replacement programme indicates that on the grounds of commonality, cost and timescale, there are considerable benefits to utilizing delivery systems already in existence or under study or development. Purely national developments are likely to be high risk on technical grounds and cost. An international collaborative development; a US collaborative development; a French collaborative development; and an off the shelf purchase will likely be the most effective solution.

Sixth, selecting an existing delivery vehicle involves a complex political balance. Given the UK's longstanding and intimate nuclear relationship with the US, a US delivery vehicle is undoubtedly the logical choice. However, a French delivery vehicle would significantly boost Anglo-French defence relations and would be seen as a demonstration of a stronger UK contribution to European defence. However, UK cooperation with France could adversely affect the UK's longstanding relationship with the US, particularly on nuclear matters, especially if the decision was made to use a US warhead design and marry it to a French delivery system. But not choosing a French delivery system would likely be interpreted as a serious setback to Anglo-French relations. Collaboration is likely to be seen as a touchstone of Anglo-French bilateral defence relations.

Seventh, at the height of the Cold War AWE lacked the design capability, manufacturing capacity, and availability of skilled staff to design, produce and place into service more than one nuclear warhead at a time. The WE-177 replacement programme suggests that the major factor affecting the timescale for the introduction of any new nuclear system will be the capacity of the Atomic Weapons Establishment (AWE), which is currently occupied with certifying the safety and reliability of the existing Mk.4A Holbrook warheads for the Trident system, and designing and producing the Trident successor warhead, the A21/Mk7 Astraea.

Eighth, collaboration with France on a new nuclear warhead could constitute such a significant realignment of the UK's nuclear efforts that it could carry unacceptable risk to the vital relationship with the US under the 1958 Agreement. Depending on the exact form of cooperation, there could be significant political penalties and almost certainly additional costs.

Ninth, the financial and political implications of acquiring a new nuclear weapons system will be considerable. There is no provision in the MOD budget for a sub-strategic delivery vehicle or nuclear warhead. The cost will be virtually impossible to conceal and is likely of itself to be a potential cause of public contention.

Finally, even though UK defence spending is expected to increase to a target of 2.5% of GDP by 2027, given the parlous state of the UK's

armed forces, and the UK Atomic Weapons Establishment is occupied with the design and production of a new nuclear warhead for the Trident strategic system, acquiring a separate, distinct sovereign sub-strategic nuclear weapons capability, either independently or in collaboration with an international partner, is likely to be unaffordable without a substantial increase defence expenditure and an expansion in the UK's nuclear weapon design and production capacity.

While much has changed since the end of the Cold War, perhaps the enduring lesson from the WE-177 replacement programme is that the fundamental problem which has troubled British nuclear policy since the dawn of the nuclear age remains: It is not a question of what the Government would like to do, but what it can afford to do given the strategic environment it now faces.

Annex I

TNWPSG(84)1(Final), An Examination of the Rationale for Independent United Kingdom Theatre Nuclear Weapons (Paper by Defence Secretariat 17 and the Defence Programme Staff (Nuclear)), 14 September 1984

SECTION II: THE RATIONALE

GENERAL

7. The prime object of British defence policy, as of NATO defence policy as a whole, is to deter aggression. The value of the constituent elements of our defence forces depends on the extent to which they contribute to deterrence; and this in turn depends critically on Soviet perceptions. The strategy of flexible response adopted by NATO incorporates a readiness to initiate the first use of nuclear weapons if necessary, and by posing the consequential risk of escalation to a strategic nuclear exchange, seeks to deter the Soviet Union from threatening or undertaking military operations. If this primary purpose were to fail, implementation of the strategy would be designed to persuade the Soviet Union to cease aggression and withdraw. There is no direct parallel in known Soviet thinking, which does not appear to recognise NATO's concept of deterrence, limited nuclear war or the use of nuclear weapons to signal political resolve and intention. Soviet writings emphasise that once the nuclear threshold has been crossed there is no certainty that the level of escalation can be controlled, and they are primarily concerned to protect their homeland from the consequences of any such escalation. The extent to which they might be deterred from aggression would therefore be heavily influenced by their perception of the readiness of their putative victim to resort to nuclear weapons; they themselves would if at

all possible wish to conclude hostilities by conventional means, but they avow that their response to any use or threatened use of nuclear weapons would be a large scale use of nuclear weapons with the intention of pre-empting first or subsequent use by their opponent.

8. We consider below the potential contribution which a UK sub-strategic nuclear capability might make to deterrence in three following areas:
   a. Within the NATO context.
   b. As a contribution to our national military capability.
   c. As a means of underpinning the national strategic deterrent force.

THE NATO CONTEXT

9. The UK's current range of theatre nuclear forces makes a significant contribution to the Alliance, emphasising our national commitment to the policy of risk-sharing to enhance coherence and cohesion, and a geographic spread of nuclear assets to enhance survivability and credibility. Our ability to deploy nuclear weapons in ship-based fixed and rotary wing aircraft is unique among the European NATO allies and our forces make up about 20% of the total land based dual capable aircraft, while the WE-177 stockpile assigned to NATO represents some 12% of the air delivered bombs deployed in ACE. Failure to sustain a role of this magnitude would carry implications for the Alliance as a whole, if it were interpreted as a reduction in the UK's commitment to the nuclear element of the strategy of flexible response, and would provide encouragement to the Soviet Union. Any move towards reducing the UK's contribution to Alliance TNF would therefore need to take these aspects fully into account.

10. The tasks currently undertaken by UK army units with nuclear artillery and Lance and by the RAF with Nimrod aircraft are met with dual key systems; and the tasks assigned to RAF strike aircraft within NATO could be undertaken in a similar fashion. Any approval to the question of a future British TNW role would therefore need to consider whether a continued UK contribution to Alliance TNF should necessarily be provided by nationally-owned weapons or whether US provided dual key systems would suffice. Dual key systems are likely to be a more economical method of contributing to NATO's nuclear capability and of indicating to the Soviet Union and the NATO allies a continuing commitment to the Alliance and its nuclear posture.

11. Against this proposition, there are three political considerations which would argue for British rather than dual key weapons in the NATO context. First, in terms of British domestic politics, it would be easier to defend the provision of weapons which are entirely under national control. Secondly, a failure to maintain a British TNF force might be viewed, either by the NATO allies or by the Soviet Union, as indicating a weakening of our commitment to the nuclear role. Thirdly, the UK is by virtue of its nuclear capability placed uniquely between the USA and the remaining NATO nations to influence the formulation of Alliance policy and doctrine for assigned nuclear forces; and this position has been used to positive effect, most recently with the work leading up to the Ministerial decision on the size and composition of the nuclear stockpile in Europe (2). It is difficult to quantify the extent to which this position would be weakened by the absence of a UK national sub-strategic nuclear capability, but it is undoubtedly the case that the United States cannot but take special account of an ally with an indigenous nuclear weapons capability. It is in the UK's political and military interests that this special relationship be sustained.

12. The main significance of the UK's overall nuclear contribution to the Alliance, however, lies in its independence of the US. Nuclear weapons owned and manned wholly by the UK, able independently to be brought to bear should collective defence have failed and national interests be threatened, create a second centre of nuclear decision making in the Alliance. This adds uncertainty to the Soviet risk assessment, and increases the prospect of nuclear escalation in the event of aggression against Europe, thereby reinforcing deterrence and enhancing in turn the UK's own national security. Dual key systems are however by definition not under exclusively British control; and while they can contribute to NATO's overall nuclear posture, they cannot in any sense contribute to an independent British nuclear role. It is possible that the Soviet Union might in certain circumstances perceive that the UK would be more likely than the United States to use its own completely independent sub-strategic nuclear forces in the event of Soviet aggression in Europe; and that such forces would therefore of themselves contribute to overall NATO deterrence. This is certainly a view held in some quarters within the Alliance. It can be argued that this is a possibility that the Soviet Union can never completely exclude from their calculations; and to the extent that this is true, then deterrence is inevitably to some degree strengthened.

13. It can however equally be argued that the Soviet Union would be unlikely to regard the use by the UK of sub-strategic forces as

credible (and therefore likely) except in circumstances where the very survival of the UK was directly threatened and where the UK might therefore be prepared to run the risks of escalation to the strategic level. It is therefore for consideration that a sub-strategic UK contribution to deterrence in the NATO context would not be credible unless there were a credible national rationale for the existence and employment of that capability. Paragraphs 17 to 23 consider the potential national requirement in more detail.

14. If the UK were to decide against a national TNW replacement it would still be necessary to consider how the UK commitment to NATO's collective nuclear deterrent might best be met. It is likely that the specific characteristics dictated by NATO planning for a UK sub-strategic nuclear force would differ from those to meet purely national requirements. While national requirements would almost certainly take priority over those of the Alliance, it should be possible, in configuring such a force, to take account of both. If there were any residual problems of capability gaps, these would need to be tackled in their own right. We have however taken the view that consideration of how the UK might best contribute to NATO's strategy of flexible response cannot be undertaken until a definitive view has been reached on the national requirement.

AS A CONTRIBUTION TO OUR NATIONAL MILITARY CAPABILITY

15. The use of nuclear weapons would be immensely destructive compared with the use of conventional weapons. It is however extremely unlikely that nuclear weapons could ever sensibly be used simply as a substitute for or supplement to conventional forces. NATO recognises that it could not "win" a limited exchange of nuclear weapons in Europe because the Warsaw Pact would be unlikely to suffer greater damage than the Alliance. This conclusion applies writ large if nuclear weapons were used by the UK acting alone. Whilst the Soviet Union would suffer considerable damage from the use of UK sub-strategic nuclear weapons, the Soviet war machine could not be militarily defeated or even impaired sufficiently to affect the outcome of the conflict in overall terms by our current TNW stockpile or a future force of comparable size. On the other hand, the use of even a small fraction of the Soviet nuclear weapons stock would inflict damage on the UK on an unacceptable scale. The disparity between the two sides in available forces and in vulnerability to damage is such that a "limited" use of nuclear weapons for war-fighting is militarily unrealistic. Indeed their use would put at risk the very survival of the UK which we would be seeking to ensure. This suggests that an exclusively war-fighting role for British TNW would not be appropriate and that their utility in a national context should

be considered only in terms of the extent to which they enhance the effectiveness and credibility of the strategic deterrent. (The relevance of these arguments to the maritime ASW role is discussed in paragraphs 33–35).

16. It can be argued however that if it is considered necessary to be able to deter a nuclear threat, probably on a comparatively small scale, from a country outside NATO or the Warsaw Pact, a separate UK sub-strategic nuclear force would have a distinct utility. If it is believed that a lesser power would not perceive as credible the use by the UK of its principal nuclear system so long as there is a threat from the Soviet Union which would preclude the UK from compromising the strategic force, then the possession by the UK of an additional lower level nuclear capability in closer proportion to the scale of the lesser threat could be seen as a more credible deterrent. The extent of nuclear proliferation in the timescales envisaged can only be a matter of speculation, but a number of countries possess the potential to develop nuclear weapons in the foreseeable future. Not all of these countries maintain a stable relationship with Britain. It can be argued that a conflict between the UK and some other nuclear power is in fact easier to envisage than one between the UK and the Soviet Union although it is doubtful whether such a conflict would threaten the existence of the UK. The credibility of deterrence is a function of the likelihood of use and prima facie, the UK would be more likely to use a theatre nuclear weapon rather than part of its strategic inventory against a "rogue" nuclear power. It can on the other hand be argued that a strategic nuclear force deployed on a scale necessary to deter aggression by the Soviet Union would be sufficient to deter a lesser threat. In these circumstances it is doubtful whether the provision of a separate sub-strategic force could be justified.

UNDERPINNING THE NATIONAL STRATEGIC DETERRENT

17. In paragraphs 9 to 16 above we have argued that the case for or against the maintenance of a TNW capability depends on a judgement as to whether such a capability would enhance the credibility of the national strategic deterrent. NATO policy, as described in MC 14/3, is based on the proposition that the Soviet Union would not consider credible a defence posture dependent on the willingness of the United States to respond to every form of aggression with nuclear weapons. NATO strategy therefore calls for the possession of a range of options at lower levels of force which reinforce the commitment of the Alliance to use all means available for its defence, as necessary. The essence of this approach is that an enemy must regard sub-strategic forces as more likely to be used than the weapons which they reinforce. Unless this

were so then they could not effectively fulfil their "underpinning" role, and they would contribute nothing to deterrence. The Alliance policy is therefore designed to ensure that by possessing a range of options it has the flexibility to respond according to the circumstances, and the Soviet Union will perceive that it is more likely to do so. Such a strategy includes the capacity to escalate a conflict in order to persuade an enemy to discontinue a military action by confronting him with the risk of further escalation. It is the Soviet perception of the risk of escalation which is central to the effectiveness of this strategy as a deterrent.

- 18. It is for consideration to what extent these factors apply to the UK acting independently, and to what extent therefore this logic should determine our approach to a definition of requirements. In their consideration of the "Criteria for the UK National Deterrent in the Trident Era", the JIC briefly considered some aspects of this issue, and observed:

  On balance, we believe that these arguments support the case for having a nuclear option to strike the Soviet territory or forces at a level lower than the strategic.

  The focus of the JIC's considerations, and subsequent Ministerial endorsement, was however on the strategic element of our deterrent force. The question of a sub-strategic capability was not studied in depth, and it is therefore necessary to set out the arguments fully.

THE CASE FOR

19. In principle, the logic of NATO policy can be also followed in the national context. The national strategic deterrent force is by definition a weapon of last resort; it cannot be employed, certainly in all-out use, without the near certainty that nuclear annihilation would follow. Its value is therefore determined by the extent to which its employment can be threatened with a sufficient degree of credibility to persuade an enemy that use is a real possibility, and that in being used it would cause an unacceptable degree of damage. The Soviet Union is apparently sceptical about the possibility of escalation being controlled, once the nuclear threshold has been crossed; and it would therefore be likely to aim to terminate any conflict with the UK without using nuclear forces. The Soviet Union is militarily capable of doing this. It might believe that the UK, even under the pressure of such an attack, would not be ready to respond with our strategic nuclear forces, and thereby provoke Soviet retaliation bringing about our total destruction. Moreover, although Soviet doctrine attaches much importance to any use of nuclear weapons being on a large scale

in order to achieve decisive results, particularly in a pre-emptive role, it is possible that against a lesser nuclear power such as the UK, with an effective and essentially invulnerable strategic nuclear force, their calculations might be different. The Soviet Union might discount the use by the UK of its strategic capability in direct retaliation for an attack which did not immediately threaten the survival of the UK. It might however be less certain that, under sufficiently desperate circumstances, the UK would not resort to the use of sub-strategic nuclear weapons in a manner that, while risking a massive nuclear exchange, left open the possibility that it might be avoided.

20. In this context it can be argued that the very existence of less capable and potentially less escalatory weapons carries with it the inescapable risk of use; that it is undoubtedly psychologically easier to take the lesser step of a limited use of nuclear weapons rather than the greater and final step of a strategic strike; and that in these circumstances the Soviet Union cannot but perceive that the likelihood of use would be greater. Moreover, the Soviet Union would also have to consider whether the possession of such weapons reflected a determination which would not otherwise be signalled if our nuclear forces were limited to a single system of last resort, particularly where the question is one of sustaining an existing capability, rather than acquiring a new one. Failure to replace the WE-177 force might be viewed by the Soviet Union as a weakening of UK resolve or a reversion in the national context to a "tripwire" strategy. In the NATO context the UK currently subscribes to the theory that strategic forces are not credible unless supported by sub-strategic systems. To depart from this thesis in the national context might cast doubt on the credibility of our own strategic deterrent.

THE CASE AGAINST

21. On the other hand it can be argued that the possession of any limited capability might signal to the Soviet Union a lack of faith in or an unwillingness to contemplate making use of our last resort capability, or a readiness to contemplate some form of limited nuclear aggression against us without ourselves resorting to a nuclear response on a scale which would do unacceptable damage to the Soviet Union. If that were so, then deterrence would be weakened rather than strengthened by the provision of a UK independent substrategic capability. It can also be argued that notwithstanding the demise of "tripwire" philosophy in a NATO context, deterrence is better served in the purely national context by making it clear that any type of aggression against the UK runs the risk of calling down the ultimate sanction, rather than

some lesser reaction which the Soviet Union would find easier to contemplate.

22. These arguments are reinforced by the proposition that the British position is in some respects different from that of the NATO Alliance as a whole. The concept of "levels" of conflict which has significance in the context of a NATO wide struggle means very little in the context of a war between the Soviet Union and the UK. The UK is highly vulnerable to even a "limited" Soviet nuclear attack, which would produce catastrophic damage, possibly threatening the UK's survival. In certain circumstances it is possible that the Soviet Union might be deterred by the threat of the limited damage which could be inflicted by a sub-strategic force. This would be so if for instance their aims were limited or if they perceived a possible threat from the USA or from China. It is however only the UK strategic deterrent which can be certain of being able to inflict on the Soviet Union a level of damage which the Soviet leadership would consider unacceptable. The application of any lesser degree of force by for instance a sub-strategic weapon system would by definition be inadequate.

23. In the NATO theory of flexible response, escalation is intended to confront the Soviet Union in its assessment of any particular action, with the choice of withdrawal or, if they choose to continue, of risking further escalation. They would themselves not necessarily need to escalate in order to win, and they could not be defeated by NATO in a large-scale nuclear exchange in the theatre of operations. Nonetheless the scale of NATO's TNF provision is such that if the Alliance were to make extended use of TNF the Soviet Union would be unlikely to prevail unless they resorted to nuclear weapons on a comparable scale. The likely costs of such an exchange would be very great, and the risk of further escalation immense. In the national context their calculations would be very much simpler. They would not even need to respond in kind in order to win. Only the use of the UK independent strategic deterrent would prevent a Soviet "victory"; and it could do so not by inflicting direct military damage but by inflicting damage of a different kind and order of magnitude. In these circumstances the role of national sub-strategic nuclear forces could therefore only be that of a "warning shot" to make it clear that the UK would indeed be prepared to cross the nuclear threshold and thereby to confront the enemy with the same risk of "unacceptable damage" (by the employment of our strategic system) that we would already be facing as a result of his actions, and which he would by definition be anxious to avoid; the purpose of possessing them would be to signal in advance of any aggression that the UK had the means to resort to nuclear weapons in response to a direct threat to its vital

national interests without necessarily provoking a massive nuclear exchange. Such an argument of course bears a close resemblance to French thinking on the same subject where their substrategic weapons systems are publicly described as providing the means of firing a final "warning shot" before strategic weapons are used. But it raises a further consideration. If the employment of sub-strategic weapons for warfighting is militarily unrealistic for the reasons discussed at paragraph 15 and paragraph 22, and if the purpose of using them is no more than to show notice of preparedness to employ our strategic systems in circumstances when our readiness to do so had already been discounted, the Soviet Union might not believe that employment was in fact likely. In these circumstances a sub-strategic force would appear to add nothing to deterrence.

DISCUSSION

24. This section has sought to identify those factors on which the case for the maintenance of an independent sub-strategic force rests or falls. A number of propositions have been advanced which the Group will wish to consider:
    a. We have recognised that there is a strong case for the UK continuing its sub-strategic nuclear role within NATO.
    b. We have suggested however that the fact of UK ownership of TNW warheads assigned to NATO is not central to that role; and that independent UK weapons contribute additionally to deterrence only if there is a credible national rationale for their employment.
    c. We have concluded therefore that any continued UK contribution to NATO is not of itself a sufficient rationale for a UK force; and that the means of sustaining a NATO role cannot finally be determined until we have established the nature of any national requirement.
    d. We have concluded that there is no case for the UK to possess an independent sub-strategic force exclusively for warfighting purposes against the Soviet Union.
    e. We have suggested that a UK TNW force may be more likely to deter a "third world" nuclear threat than a UK strategic force, although we doubt whether by itself this constitutes a sufficient rationale for a UK force.
    f. We have concluded that the case for or against an independent TNW capability depends critically on the extent of its contribution to the credibility of the independent strategic deterrent.
    g. We have concluded that a judgement is required in the light of the arguments deployed at paragraphs 17–23, whether the existence of a lesser capability than the strategic deterrent is essential; or whether it is desirable but not essential; or

whether such a capability is neither essential nor desirable for the credibility of the national strategic deterrent.[165]

165. TNA/DEFE/69/1438, TNWPSG(84)1(Final), An Examination of the Rationale for Independent United Kingdom Theatre Nuclear Weapons (Paper by Defence Secretariat 17 and the Defence Programme Staff (Nuclear)), 14 September 1984

Annex II

TNA/DEFE/25/678, United Kingdom Theatre Nuclear Weapon Successor System, Report on the Findings of the Theatre Nuclear Weapon Steering Group, Annex, The Rationale for An Independent UK Theatre Nuclear Weapon Capability

The Rationale for an Independent UK Theatre Nuclear Weapon Capability

GENERAL

The prime objective of British defence policy is to deter aggression, either acting alone or in alliance with others. The value of the constituent elements of our defence forces depends, therefore, on the extent to which they contribute to deterrence; how much they contribute depends critically on the effect they have on the perceptions of potential enemies about our military capabilities and political resolve. With this in mind, the case for the retention of a UK sub-strategic nuclear capability can be considered in terms of the contribution theatre nuclear weapons might make firstly to the overall credibility of our independent nuclear deterrent, secondly within the context of the NATO Alliance and thirdly in relation to a future out of area role.[166]

THE CONTRIBUTION TO OUR NATIONAL NUCLEAR CAPABILITY

2. The use of theatre nuclear weapons in an exclusively war fighting role by the UK, acting alone against the Soviet Union, would be wholly unrealistic. While the Soviet Union would suffer considerable damage, the Soviet war machine could not be defeated militarily by the use of our current TNW stockpile. On the other hand, the use of even a small fraction of the Soviet

166. TNA/DEFE/25/678, United Kingdom Theatre Nuclear Weapon Successor System, Report on the Findings of the Theatre Nuclear Weapon Steering Group, Annex, The Rationale for An Independent UK Theatre Nuclear Weapon Capability

nuclear weapons stock would inflict damage on the UK on an unacceptable scale. On this basis, the utility of TNW in a solely national context must therefore be judged by the extent to which they enhance the effectiveness of our strategic deterrence posture by underpinning it.

3. The concept of underpinning is fundamental to the current NATO strategy of flexible response which is based on the proposition that the Soviet Union would not consider credible a defence posture dependent on the willingness of the Alliance to respond to every form of aggression with a large scale nuclear strike. Alliance policy calls, therefore, for the possession of a range of options at lower levels of force to provide the flexibility to respond according to the circumstances, and to convince the potential aggressor that such a response is more likely than without this capability. The essence here is that the Soviet Union should perceive that sub-strategic forces are more likely to be used than the weapons which they reinforce. Unless this were so then they would not effectively fulfill their underpinning role and would contribute nothing to deterrence. This coupled with the Soviet perception of the risk of escalation lies at the heart of the effectiveness of the current strategy. Do the same factors apply to the UK acting independently? There are arguments on both sides.

4. It could be argued that the possession of a sub strategic nuclear capability might signal to the Soviet Union our lack of faith in, or an unwillingness to contemplate using our last resort strategic weapons. It could be further argued that a small nuclear power facing a much larger one cannot afford to enter into lower level exchanges since the larger one would be able to match and indeed step up the level of exchanges whilst absorbing the damage done to it with less difficulty. If this were the Soviet perception they might calculate that a limited strike by the UK in response to limited Soviet action was little more probable than an all out strike. There is also the view that deterrence might be better served in the national context by making it clear that any aggression against the UK would run the risk of our immediately resorting to the ultimate sanction; it is only the strategic deterrent which, by definition, can inflict on the Soviet Union the level of damage which the leadership would regard as unacceptable.

5. On the other hand, it can be argued on the analogy of the NATO case that there could be some circumstances of lower order aggression against the UK when the threatened use of our strategic nuclear systems, with the inherent risk of national annihilation, would not be credible. The very existence of less capable and potentially less escalatory weapons carries with it the greater risk of use

and the Soviet Union cannot but perceive this. It is undoubtedly psychologically easier to take the lesser step of a limited use of nuclear weapons rather than the greater and final step of a strategic strike; indeed it could be argued that we should never place future decision makers in a position where, in a crisis, they were faced with an all or nothing choice. There is the further point that the Soviet Union would have to consider whether the possession of sub strategic weapons reflected a determination which would not otherwise be signalled if our nuclear forces were limited to a single system of last resort, particularly where the question is one of sustaining an existing capability, rather than acquiring a new one. Failure to replace the TNW force might be viewed by the Soviet Union as a weakening of UK resolve or a reversion in the national context to the now outmoded tripwire strategy. In the NATO context the UK currently subscribes to the theory that strategic forces are not credible unless supported by sub-strategic systems. To depart from this thesis in the national context might cast doubt on the credibility of our own strategic deterrent.

THE NATO CONTEXT

6. The UK's current range of theatre nuclear forces makes a significant contribution in numerical terms to the Alliance accounting for some 20% of NATO's land based dual capable aircraft and 12% of the air delivered bomb deployed in ACE. This is a practical demonstration of the UK commitment to the nuclear element of flexible response and a symbol of our willingness to share nuclear burdens which in itself helps cement Alliance cohesion. It also allows a greater spread of nuclear assets, thereby enhancing their survivability. However it has to be recognised that much the same effects could be achieved by replacing UK TNW with US dual key weapons with substantial savings. The justification for an independent UK sub strategic capability in the NATO context lies elsewhere.

7. Nuclear weapons owned and manned wholly by the UK, able to be brought to bear independently should collective deterrence have failed and national interests be threatened, create a second centre of nuclear decision making in the Alliance. The effect of this is that the Soviet Union has to calculate not only what the reactions of one nuclear power might be, but two. This inevitably complicates their judgement and planning, increasing the dangers they face as a consequence of any aggression against NATO and reducing any risk they might act on a miscalculation of US resolve. The result is to strengthen deterrence in the Alliance overall.

8. In addition, the UK, by virtue of its nuclear capability placed

uniquely between the United States and the rest of NATO, is able to influence the formulation of Alliance policy and doctrine for assigned nuclear forces. Of particular importance is the effect the independent UK force has of locking the United States into the defence of Europe, including may be even stiffening US resolve in a crisis, and ensuring the US commitment to the flexible response strategy. Due weight also needs to be given to the effect on the United States and other allies of the UK jettisoning its independent TNW force and what it would do to their perception of our own future commitment.

AN OUT OF AREA CAPABILITY

9. The extent of future nuclear proliferation can only be a matter of speculation, but a number of countries outside the Warsaw Pact and NATO possess the potential to develop nuclear weapons. Not all of these countries maintain a stable relationship with Britain. It could be argued that a strategic nuclear force deployed on a scale necessary to deter the Soviet Union should be sufficient to deter a lesser threat and that the provision of a separate sub strategic force in the out of area context cannot be justified. However, if it is believed that a lesser power would not perceive as credible the use by the UK of its principal nuclear system so long as there is a threat from the Soviet Union which would preclude the UK from compromising the strategic force, then the possession by the UK of an additional lower level nuclear capability, in closer proportion to the scale of the lesser threat, could be seen as a more credible deterrent.[167]

167.TNA/DEFE/25/678, United Kingdom Theatre Nuclear Weapon Successor System, Report on the Findings of the Theatre Nuclear Weapon Steering Group

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