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British Nuclear Doctrine: The 'Moscow Criterion' and the Polaris Improvement Programme

John Baylis

This article focuses on continuity and change in British nuclear doctrine, especially in terms of targeting policy. After an initial assessment in 1945 that nuclear weapons would be scarce and would therefore have to be targeted, if war broke out, against urban centres, British nuclear strategy in the early Cold War period was based upon the concept of counter-force deterrence. This meant that projected nuclear forces were targeted against Soviet military forces in order to reduce damage to the United Kingdom because of its particular vulnerability in the nuclear age. Just as Britain deployed its first nuclear weapons, however, the superpowers were developing thermonuclear weapons. This led to a re-evaluation of British nuclear doctrine in the late 1950s in which Britain sought greater interdependence with the United States and, at the same time, stressed the importance of maintaining an independent targeting policy. 'Deterrence in concert' with the United States involved targeting a mix of military and urban centres, while 'unilateral deterrence' now targeted Soviet cities. The Polaris force, deployed in the late 1960s, was particularly suited for counter-value targeting. Almost immediately, however, Soviet ABM developments caused strategic planners in Britain to undertake an improvement programme, designed to ensure that counter-vale deterrence maintained its credibility. Critical to this conception, it was believed, was the ability to target Moscow, and the secret British Chevaline project was designed essentially to maintain this priority. This article sets out to explain the importance of the 'Moscow criterion' in British nuclear doctrine and the difficulties Britain faced in trying to maintain the capabilities, which would achieve what successive governments perceived to be the central requirements of deterrence.

John Baylis is Head of the Department of Politics and International Relations and Pro-Vice-Chancellor at Swansea University. His research focuses on the areas of the British defence policy, Anglo-American defence relations and nuclear history, and he is currently working on the Chevaline Project. His publications include *Anglo-American Defence Relations 1939–1984* (Macmillan, 1984); *British Defence Policy: Striking the Right Balance* (Macmillan, 1989); *The Diplomacy of Pragmatism: Britain and the Formation of NATO, 1942–1949* (Macmillan, 1993); and *Ambiguity and Deterrence: British Nuclear Strategy 1945–1964* (Oxford University Press, 1995).

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Introduction

> It has been the preference of Government to allow (adversaries) to draw their own conclusions rather than to describe precisely what our plans and capability would be in terms of targeting policy.[1]

Shortly before this statement was made by a Ministry of Defence witness giving evidence to the House of Commons Defence Committee, Francis Pym, the Secretary of state for Defence in the new Thatcher government, revealed for the first time in public that for many years previously both Conservative and Labour governments had been secretly working on a Polaris improvement programme, which was codenamed *Chevaline* in the mid-1970s.[2] Despite this public announcement, what *Chevaline* was, and what it was designed to do, remained shrouded in mystery for the remainder of the Cold War. Although the full story has yet to be told, recently released documents have thrown new light on both British nuclear targeting policy at the height of the Cold War and the technological changes successive governments believed were necessary to maintain the effectiveness of the nuclear deterrent force.[3] Critical to these developments was the emphasis successive governments gave to what was called the 'Moscow criterion': the ability to deter the Soviet Union through maintaining an ability to threaten, and therefore potentially to kill, millions of people in the Soviet capital. This article discusses how this 'mind set' emerged and the link between the development of British nuclear capabilities, especially the *Chevaline* programme, and official thinking about the 'Moscow criterion' (in terms of the perceived requirements of nuclear deterrence) during the 1970s and 1980s. To understand the nature of this link, it is necessary to begin with a brief account of the changing nature of British nuclear doctrine in the 1950s and 1960s.

The Evolution of British Nuclear Doctrine

Right from the beginning of the nuclear age in 1945, the Attlee government recognised that previous approaches to defence were 'completely out of date'.[4] Defence policy now had to rest on a new conception of deterrence. As the Prime Minister told President Truman in September 1945, 'the only deterrent is the possibility of the victim of such an attack being able to retort on the victor'. Attlee's view was quite explicit: 'The answer to an atomic bomb on London is an atomic bomb on another great city'. With this in mind the Labour government decided to independently procure atomic weapons and a long-range bomber force. Ideas about how these weapons might be used to deter the perceived threat from the Soviet Union were initially, however, rather hazy.[5]

In a report produced by the Chiefs of Staff Atomic weapons subcommittee in early 1946 it was argued that nuclear weapons would be in short supply for the foreseeable future and consequently they would have to be used sparingly against the most important targets. These were likely to be urban centres. The report argued that

'the bombing of towns and industry now gives a far greater return for war effort expended and may, therefore, become the most profitable type of war'.[6] Despite this view, given the vulnerability of the UK to destruction and the unwillingness of the United States (contravening the wartime Quebec and Hyde Park agreements) to share its nuclear secrets with Britain, strategic planning initially focused on trying to limit damage to the UK by targeting air bases in the Soviet Union.[7] In their review of Global Strategy in 1947 the Chiefs of Staff concluded that: 'It is essential that before such destruction – from which we might never recover – could be achieved, we ourselves should assume the initiative and destroy the enemy's means of making war... It is only by early offensive action that the weight of attack on the United Kingdom can be materially decreased.'[8] Similarly, in a report written in 1949, the Chiefs of Staff argued that it was necessary for Britain to target 'the atomic plants and bases of the enemy, as this is the only way of ensuring that this country remains sufficiently undamaged to continue prosecution of the war'.[9] This reflected a view of deterrence based essentially on developing nuclear forces which would have war-fighting capabilities.[10]

The development of thermonuclear weapons and long-range missiles, however, brought about a revision in British strategic planning towards the end of the 1950s. Britain needed to develop its own thermonuclear weapons and its own long-range missiles but the costs of keeping up with the two main superpowers required more interdependence with the United States. In late 1957 Britain and the United States agreed to co-ordinate the nuclear strike plans of Bomber Command and the US Strategic Air Command (SAC). The Joint Planning Staff (JPS) produced a report entitled 'Allied Strike Nuclear Attack', which envisaged an attack on 800 targets including airfields, nuclear storage facilities, centres of administration and the Soviet transport system.[11] As a result of this report, the Chiefs of Staff developed a dual targeting policy. The plan, co-ordinated with the US, included a mix of city and military targets. At the same time, however, there was a growing conviction that there was still a need for a unilateral strike plan, given the uncertainty of US response in the event of war. The Suez crisis, in particular, had a rather mixed impact on British defence planners. It was recognised that in future Britain had to work closely with the US. On the other hand, some form of independent military planning was necessary, just in case the United States let Britain down again. In nuclear terms, it was believed that this unilateral plan should concentrate on the ability to hold Soviet cities as hostage. Bomber Command's Emergency War Plan was produced in 1958 and an emphasis was given to targeting 44 major cities in the Soviet Union.[12] It was argued that there were 130 Soviet cities with a population of 100,000, but only 54 of them were regarded as being of major importance. Ten of these were outside the range of the British V-bomber force. The calculation by strategic planners was that the ability to destroy 44 cities would destroy 30 per cent of the Soviet urban population, killing 38 million people. This rough and ready estimate was regarded as sufficient to deter the Soviet Union and remained the basic requirement for deterrence for a number of years.

In a detailed report produced by the British Nuclear Deterrent Study Group at the end of December 1959, it was argued that the long-range V-Bomber force should be able to make:

> successful attacks on about 40 of the major centres of industry and administration in the Western areas of the Soviet Union. An attack in which one warhead of 1-MT yield was delivered on the centre of each of the target cities would, except for Moscow and Leningrad, destroy at least 50 per cent of each of the targets. Moscow and Leningrad required respectively four and two deliveries of 1-MT to destroy 50 per cent of their buildings. There are, therefore, a total of 44 separate aiming points in the selected target areas.[13]

4 x 1MT
= 12 x 200 kt
= 18 x 100 kt.
2 x 1MT
= 6 x 200 kt
= 9 x 100 kt

This growing emphasis on city targeting, especially Moscow, was reflected in the findings of another specialist committee set up in 1959 to make a detailed analysis of the future of global war. A series of theoretical war-gaming exercises were undertaken by the Global War Studies Committee. Their conclusion was that a purely counter-force strategy was no longer likely to be effective as a deterrent. 'Attacks on strategic bases... indicated that it was unlikely either side could knock-out all the other's bases.'[14] The major problem was the lack of the kind of detailed intelligence that would be necessary to map Soviet military targets with the kind of precision that was necessary. The Committee, therefore, recommended that it would be preferable to put greater emphasis in terms of targeting on 'the major centres of population' in the Soviet Union.[15] While it was still recognised that co-ordinated strategic planning with the US required the capability to 'suppress' Soviet military forces, the trend therefore in the late 1950s and early 1960s was towards a greater emphasis on unilateral deterrence by targeting 40 Soviet cities with populations in excess of 100,000 people.

In 1960 the proposed Blue Streak missile which was designed to take over from the V-Bomber force was cancelled for a combination of strategic and economic reasons.[16] In its place an agreement was signed with the United States to buy Skybolt, an air-launched ballistic missile that would enhance the capability of the existing V-Bomber force. At much the same time further discussions took place in the British Nuclear Deterrent Group about the level of damage that was likely to deter the Soviet Union. The Chairman of the Group, Sir Robert Scott, was not convinced that the destruction of 40 cities was required and requested that a new planning assumption should be adopted. Scott told the Defence Minister, Harold Watkinson, that the figure of 40 cities had been 'arrived at arbitrarily' and recommended that the figure should be significantly reduced to ten cities.[17] Why ten cities was chosen was far from clear but Watkinson's support for this change in a report to the Prime Minister, Harold Macmillan, suggests that ten cities was no less arbitrary.

> I am, therefore, now seeking a decision on whether such a reduction of damage level is likely to be politically acceptable and, if so, your authority to authorise an examination of the consequences of reducing our strategic

nuclear capacity to the level required to inflict equivalent damage on 10 instead of 40 cities.[18]

Watkinson pointed out that the decision was important because it would affect the number of Skybolt missiles that would be needed from the US. The smaller the number of cities targeted, the fewer Skybolt missiles would have to be purchased.[19]

When the issue came to be discussed by Ministers in March 1962 it was decided, again, it appears for largely arbitrary reasons, that the figure could be reduced from 40, but to 15 rather than ten.[20] The number seems to have been chosen partly as a result of a feeling amongst the Air staff that ten was too few to provide effective deterrence and partly as a result of pressures from the Treasury.[21] It appears that this was a decision based largely on political judgement rather than on detailed strategic calculation.

The decision to focus on 15 cities as the basis of unilateral deterrence also seems to have led to a revision of the joint Anglo-American strategic plan. By 1962 a new plan had been produced with 98 targets assigned to Britain, of which 16 were cities and 44 were offensive airfields. (This compared with a total of 106, with 69 cities, 17 bomber bases and 20 Soviet air defence systems in the previous plan).[22]

The decision to reduce the number of cities that needed to be targets for deterrence purposes was critical in the purchase of Polaris from the United States in late 1962. Following the cancellation of Skybolt by the Kennedy Administration in December, the Navy played a key role in persuading the British government that Polaris would be the most effective alternative. Control of the nuclear deterrent had traditionally been in the hands of the RAF but Polaris offered an invulnerable submarine-based force operated by the Navy.[23] The difficulty was that only a small number of such submarines could be afforded given Britain's difficult economic circumstances. The problem was resolved by yet another re-evaluation of what deterrence required. A Joint Intelligence Committee analysis concluded that: 'The current intelligence assessment was that the Russians would regard the certain destruction of five of their largest cities as an unacceptable risk'.[24] Given that it was believed that deterrence now required the ability to destroy only five cities, a force of four to five Polaris submarines offered an affordable alternative at a time that the V-Bomber force was becoming increasingly obsolescent. This paved the way for the meeting at Nassau in December 1962, when Macmillan managed to persuade Kennedy to provide Britain with Polaris. Initially it was envisaged that the A.2 version would be sold to Britain. Eventually, however, the A.3 version was provided with three re-entry vehicles (which were not independently targetable). This improved missile was not, however, capable of high-precision targeting, making it very much a counter-value weapon system.

The Polaris Improvement Programme

As soon as the Polaris system was deployed, between 1968 and 1970 questions began to be asked about its medium-term effectiveness. In November 1966 the United States announced that the Soviet Union was deploying an anti-ballistic missile system (ABM)

around its major cities (code named Galosh).[25] Given that the government could only be sure of one Polaris submarine in service at any time, officials increasingly became concerned that the limited capability available could pose a threat to the Soviet capital.[26] By this time, within official circles, deliberations mostly accepted that the ability effectively to target Moscow ('the Moscow criterion') was now the critical element of deterrence credibility.[27] With ABMs deployed around the Soviet capital this could not be guaranteed. The requirements of unilateral deterrence therefore had been revised from 40 to 15 to five, and now in essence was only one city, the Soviet capital. Other areas continued to be targeted (including Leningrad, Tallin and the Kola Peninsula) but the ability to destroy Moscow was by far the most important priority.[28]

In private, officials expressed their concerns about the de-stabilising effects of the deployment of ABM systems. It was felt that Soviet deployments and the US response would lead to an arms race which would undermine international security in general and increasingly weaken the credibility of the British nuclear deterrent. The Prime Minister, Harold Wilson, was advised that he should raise concerns about a new arms race with the Russian leader, Kosygin, when they met in February 1967, and also to try to persuade the Americans that, even if the Soviet Union did go ahead with its deployment, it would not be advisable to follow suit. The Foreign Secretary, George Brown, told Wilson that it should be 'our object firstly to do what we can to convince the Russians of the potential dangers of ABM deployment; secondly, to strengthen elements in the United States administration which are resisting deployment and will have a mind to do so as long as there is any hope of its avoidance'. He also urged the Prime Minister that if deployment nevertheless took place it would be important 'to set it in a framework and within such limits as will reduce its far-reaching and possible dangerous political, psychological and military consequences'. The feeling amongst officials, in fact, was that it would be very difficult to prevent the Americans from responding and that Britain would have to accept this reality and improve its own deterrent capability accordingly.[29]

As a result, discussions began in the strictest of secrecy about how to develop counter-measures which would maintain the effectiveness of the Polaris force. In 1967 the Wilson government set up a committee under the nuclear scientist Sir William Cook. The Cook Report which was completed by the end of the year suggested that there were three alternatives: (1) to abandon Polaris, (2) to do nothing and, (3) to improve Polaris by what was described as 'hardening' and 'adding decoys'.[30] Given the uncertainties over the on-going SALT arms control negotiations, which proposed restraints on ABMs, the government decided to explore further the opportunities of improving Polaris.

Under the terms of the 1958 Anglo-American Atomic Exchange Agreement, Britain received information from the United States about its *Antelope* programme.[31] This involved initial ideas in the United States about how it might be possible to overcome Soviet defences. For Britain, however, given its limited capability (based on one submarine on station) the task of defeating Soviet ABMs was particularly difficult.

The problem was that a single nuclear detonation outside the atmosphere could destroy the three warheads carried by Polaris within a 100-mile radius after separation from the missile. *Antelope*, with its emphasis on 'hardening' (protecting the warheads from close detonations) and 'decoys' (designed to deceive Soviet radars), provided a useful way forward but did not resolve the problem of maintaining the credibility of the British deterrent threat to destroy the Soviet capital. One solution proposed was to try to purchase the new Poseidon missile from the United States. Poseidon had ten MIRVed warheads, which would be capable of 'saturating' the Soviet ABM system. Apart from the extra costs involved, the problem with Poseidon, however, was that it might involve the need for a new formal agreement with the United States which might be difficult for the US government in its dealings with Congress. For the Heath government in the early 1970s, this symbolic deal with the US, emphasising close Anglo-American ties, might also complicate plans to join the European Community. The same was also true of another option, known as 'Hybrid' or 'Stag', which would involve buying Poseidon from the US and fitting a British warhead to it.[32]

In the light of these difficulties emphasis shifted to improving the *Antelope* design. *Super Antelope*, as it became known, involved a redesign of 'the re-entry bodies to be much harder and able to function after they had been much closer to a detonation, and also to separate the re-entry bodies in-flight over larger distances so that they could not be destroyed by one nuclear detonation'.[33]

Solving these problems, however, proved to be time-consuming, technically difficult and very costly. To a certain extent the 1972 SALT Treaty eased Britain's problems by limiting Soviet ABM deployments to no more than two sites (one of which could be Moscow and one an ICBM complex). This was later reduced to one site around Moscow. The essential problem posed by 'the Moscow criterion', however, remained. Detailed work on *Super Antelope*, or what became known as the *Chevaline* project in 1974, continued in secret under the new Labour government of Harold Wilson, with only a handful of senior Ministers fully informed about the programme. Despite costs escalating from £175m in 1972 to £800m in 1977, a major review of the project in September 1976 and significant technical difficulties between 1976 and 1978, the government remained committed to seeing the project through to a successful conclusion.[34]

The first public announcement of the highly secret programme came on the 24 January 1980 when Francis Pym made the following statement to the House of Commons:

> The strategic environment in which they operate [the four Polaris submarines] and the whole alliance operates is not static. Without breaching the provisions of the 1972 treaty on anti-ballistic missile defence, the Soviet Union has continued to upgrade its ABM capabilities, and we have needed to respond to that upgrading so that we can maintain the deterrence assurance of our force. The previous Conservative government, therefore, pressed ahead with a programme of improvements to our Polaris missiles, which our immediate predecessors continued and sustained. The House will, I am sure,

> understand that I cannot go into detail, even to correct the widely mistaken assertions that have sometimes appeared in public, but I think the programme has now reached a stage where I can properly make public more information about it.
> The programme, which has the codename *Chevaline*, is a very major and complex development of the missile front end, involving also changes to the fire control systems. The result will not be a MIRVed system, but it includes advanced penetration aids over the ability to manoeuvre the payload in space. The programme has been funded and managed entirely by the United Kingdom with the full co-operation of the United States... It has been a vital improvement. I do not think the House will be surprised that is has been costly. The programme's overall estimated cost totals about £1000 million.[35]

One of the key reasons for this public announcement appears to have been political. The Thatcher government was on the point of deciding on a replacement to Polaris (Trident) and saw an opportunity to minimise opposition from the Labour Party. By announcing the involvement of the previous Labour government in the Polaris Improvement Programme and the considerable costs of a largely indigenous project, the Defence Secretary was, in effect, saying that Labour had been fully committed to the British nuclear deterrent and there was a strong case for buying a replacement off the shelf from the United States. This seems to be confirmed by David Owen's comment to the House of Commons that the decision to publicly announce the project had been made 'for purely party political reasons to justify the decision to buy Trident missiles and to embarrass the Labour Party for the fact that it had put the interests of the country first and had been ready at all times to modernise the deterrent – and it was right to do so.'[36] From Owen's point of view, Pym was making 'a cheap, party political point'.

Despite this party political dimension, the key point remained that *Chevaline*, which was eventually deployed in 1983, represented an essential continuity in British nuclear deterrent policies between both Labour and Conservative governments from the late 1960s to the period through to the end of the Cold War. Despite the defence reviews of the mid-1960s, mid-1970s and early-1980s which led to cuts in British defence expenditure, the priority of retaining a capability which could threaten Soviet cities, and especially Moscow, remained a key priority for British policy makers.

Competing Concepts of Deterrence?

British nuclear doctrine during the period from the late 1950s to the 1980s was based on two separate deterrent philosophies. Britain contributed, on the one hand, to an Alliance strategy which, despite changing labels, was largely based on 'deterrence through warfighting' or what has sometimes been called 'deterrence through denial'. In the Single Integrated Operational Plan (SIOP) which emerged from 1960 onwards there were 3,729 targets in the Sino-Soviet bloc. Some were cities but most were military or military-related establishments. As Twigge and Scott have argued: 'Once in motion, the SIOP would run its course. After transmission of an authenticated execute order there was no way to stop it'.[37] More flexibility was introduced with

the introduction of the Schlesinger doctrine in 1974–75 which emphasised the need for a greater range of nuclear capabilities in order to give the American President a broader range of choices. Nevertheless, the counterforce emphasis of the strategy remained essentially in being. This contrasted somewhat with the idea of unilateral deterrence, which was based primarily on a counter-city strategy. In an effort to make sure the two concepts of deterrence remained distinct, Sir George Mills, the C-in-C Bomber Command argued forcefully:

> Whoever would be afraid of launching a sudden attack if he thought the greater part of our retaliation would come back on his airfields? I am sure for the enemy's edification as well as our own we must be specific in saying that our aim in retaliation is to hurt him where it really hurts; I do pray we keep our minds absolutely clear on this issue.[38]

Despite the uncertainty and some ambiguity which existed over the projected role of Blue Streak in the 1950s, by the time Polaris was deployed in the late 1960s, strategic planners were clear that threatening 'where it really hurt' meant targeting cities.[39] By this stage there were no fundamental contradictions between the Alliance strategic plan and the national strategic plan.[40] Britain was assigned a series of counter-city targets in the alliance plan, together with a range of counter-force targets which would be undertaken by its long-range bombers. The counter-city targets were much the same as those in its national plan. What was critical for the national plan, however, was the ability of British nuclear forces to be able to destroy the Soviet capital, Moscow. It was this essential requirement which drove successive governments to strive to solve the range of technological difficulties associated with the *Chevaline* project. Some of these difficulties have been revealed recently from the description of *Chevaline* given by Kate Pyne, the Technical Historian at the Atomic Weapons Establishment (AWE). She has argued that at:

> The heart of the improved Polaris system was the penetration aid carrier or 'PAC'... The PAC containing the penaids and one of the two warheads would manoeuvre under the power of a twin chamber propulsion unit... The job of the PAC was to create a so-called 'Threat Tube' consisting of an elongated cloud of unhardened soft decoys, together with hard decoys that could withstand the effects of radiation.
>
> At some point during the flight of the Polaris second stage, the nose fairing separated and the first re-entry body was ejected by rocket motor. Its thrust was offset by tilting it. The gas flow from the rocket motor escaped between the re-entry body and the PAC. As it expanded in airless space, it produced a pressure which tilted the re-entry body back to its correct trajectory.
>
> Separation of the re-entry body from the Polaris second stage was followed by the departure of the PAC containing the remaining warhead. The second stage, devoid of payload, accelerated between the re-entry body and the PAC, briefly immersing both in exhaust gasses from its own motor, creating another disturbance called the 'jet wake' effect.
>
> The PAC control system oriented itself for the first manoeuvre. The twin chamber propulsion unit and the PAC moved to the designated point for dispensing some of

> the decoys. The PAC changed position again in order to eject the remaining warhead onto its required trajectory.
> The twin chamber propulsion unit fired yet again to move the PAC into position for dispensing the main sequence of decoys.
> The PAC then moved to yet another position to release the final penetration aid.[41]

Despite some American assistance, perfecting these manoeuvres had to be achieved largely by British scientists working alone and inevitably took considerable time to achieve.

Given the importance of this deterrent force to perceived national security interests successive governments were also prepared to make very significant economic sacrifices in order to see *Chevaline* through to completion. As David Owen argued in November 2000:

> One of the main arguments used against cancellation was its effect on the capability of our nuclear deterrent. It was felt that if one came forward and announced that one was cancelling a programme on which one had spent £200 million and which had been started to improve the penetration of missiles, one would flag to everybody – and very visibly to the Soviet Union – that one's existing deterrent was not effective. Nobody argued more strongly against cancellation than the Ministry of Defence and the intelligence community. They argued powerfully that it was absurd to cancel the programme, having spent so much money on it.[42]

Despite the fact that so much had been spent, deterring the Soviet Union by having the capability to destroy Moscow, dictated that the economic resources had to be found whenever the project was challenged by the Treasury. Other defence capabilities could be cut but unilateral nuclear deterrence remained paramount.

Challenging the 'Moscow Critieria'

Throughout the period covered by this review of British nuclear doctrine the 'Moscow criterion' was crucial to what was perceived by strategic planners to be one of the key requirements for unilateral nuclear deterrence. By the late 1970s, however, this requirement was beginning to be questioned. Two working parties were formed in early 1978 to look into the options for replacing Polaris.[43] One group was set up under Professor Sir Ronald Mason, Chief Scientific Advisor to the Ministry of Defence. The remit was to look into the technical options regarding a replacement. The other group, under Sir Anthony Duff, Deputy Under-Secretary at the Foreign and Commonwealth Office, was asked to look at the international implications of different replacement options. Significantly the ministerial working party, which was responsible for the terms of reference of the Duff-Mason working parties, indicated that the 'Moscow criteria' no longer needed to be given quite the same degree of priority as it had in the past.[44] Counter-city strategic planning was still seen as crucial in deterrence terms and Moscow was still important, but discussions also focused on the next nine largest cities in the Soviet Union. This represented the beginning of a subtle shift in British nuclear doctrine.

The Duff-Mason Report, completed in late 1978, recommended that the best option for Britain was to purchase Trident missiles from the United States. It was left to the Thatcher government, which won the May 1979 election, to make the decision to replace Polaris with Trident. To justify the decision the Ministry of Defence produced a special memorandum in 1980 in which it was stated that:

> Successive United Kingdom Governments have always declined to make public their nuclear targeting policy and plans, or to define precisely what minimum level of destructive capability they judged necessary for deterrence. The Government, however, thinks it is right now to make clear that its concept of deterrence is concerned essentially with posing a potential threat to key aspects of Soviet state power. There might, with changing conditions, be more than one way of doing this, and some flexibility in contingency planning is appropriate. It would not be helpful to deterrence to define particular options further.[45]

The key phrase in this statement was the continuing need to pose a threat to *'key aspects of Soviet state power'*. According to Sir Michael Quinlan, who was Deputy Under Secretary of State (Policy and Programmes) in the MOD between 1977 and 1981, this represented 'a strand of thought relatively new in official utterances on strategic nuclear issues'. Although the concept of Soviet state power did not imply that Soviet cities, including Moscow, would necessarily be exempt, it seemed to indicate that the threat, henceforth, would not be 'exclusively or even primarily directed at the destruction of cities'. Quinlan, who was Permanent Under-Secretary of state in the MOD from 1988 to 1992, has revealed that 'the impulse behind this was ethical, and reflected in some degree vigorous public debate in Britain at around this time on the moral tolerability, even in extreme circumstances, of envisaging a strike oriented essentially at populations'.[46] Polaris, even with its *Chevaline* front end, was not independently targetable and had only limited accuracy. As such, cities (and especially Moscow) were regarded as the most appropriate targets. Trident, however, opened up the possibility of changing British targeting policy to include 'more discriminate options'. As a result, as the Cold War came to an end the 'Moscow criterion' which had played such a key role in British nuclear doctrine for the previous 30 years seems to have been downgraded as a key criterion of British nuclear deterrent policy – and ethical considerations would appear to have played a role in the planning process, unbeknown to the British public.

Notes

[1] Ministry of Defence witness giving evidence to the House of Commons Defence Committee, 4 Nov. 1980.

[2] Hansard, House of Commons Debates, fifth series, Vol.977, 21 Jan.–1 Feb. 1980.

[3] See John Baylis and Kristan Stoddart, 'Britain and the Chevaline Project; The Hidden Nuclear Programme, 1967–1982', *Journal of Strategic Studies*, Dec. 2003.

[4] Margaret Gowing, *Independence and Deterrence*, Vol.1 (London, Macmillan, 1974), pp.78–81.

[5] The Chiefs of Staff established the Joint Technical Committee in 1946 to assess the role of nuclear weapons in the post-war world. The Committee reached rather ambiguous conclusions. It was argued that 'the most profitable objects of attack by the new weapon will

normally be concentrations of population, centres of distribution and communication'. At the same time it was also argued that atomic weapons were useful 'for opportunity attacks on main fleets and bases, on convoys and on military concentrations'. AIR 2/1252, TWC(46)15(Revise), Future Developments in Weapons and Methods of War, 1 July 1946.

[6] CAB 82/26, DCOS (AWC) (46) 1, 30 Jan. 1946.

[7] See I. Clark and N.J. Wheeler, *The British Origins of Nuclear Strategy, 1945–55* (Oxford: Clarendon Press, 1989); I. Clark, *Nuclear Diplomacy and the Special Relationship: Britain's Deterrent And America 1957–1962* (Oxford: Clarendon Press,1994); J. Baylis, *Ambiguity and Deterrence: British Nuclear Strategy 1945–1964* (Oxford: Clarendon Press, 1995); and L. Freedman, 'British Nuclear Targeting', *Defence Analysis*, Vol. 2, 1985.

[8] Future Defence Policy, report by the Chiefs of Staff DO(47)44, May 1947.

[9] DEFE 4/25, COS (49)143RD, 28 Sept. 1949.

[10] The Directive issued to Bomber Command in 1950 reflected this prevailing mind set: 'Your command will be called upon in war to direct its efforts against those targets whose destruction will do most to reduce the scale of attack by land and air on Western Europe including the UK.' AIR 2/5917, Command directive to Air Marshall Sir Hugh Lloyd, May 1950.

[11] The Report, JP(57)10 remains classified. See S. Twigge and Len Scott, *Planning Armageddon: Britain, the United States and the Command of western Nuclear Forces 1945–1964* (Amsterdam: Harwood, 2000), p.70.

[12] AIR 8/2400,DB(58)10, 30 Oct. 1958.

[13] DEFE 7/1328, BND (SG) (59) 19 Final, 31 Dec. 1959.

[14] DEFE 5/90 COS (59) 73, 25 Mar. 1959.

[15] DEFE 4/123, COS (59), 74th. Mtg., 1 Dec. 1959.

[16] See J. Baylis, *Ambiguity and Deterrence: British Nuclear Strategy 1945–1964*, pp.279–88.

[17] PREM 11/3716, Watkinson to Macmillan, 19 Feb. 1962) The Foreign Secretary agreed with this view and suggested that 'we should not waste a penny more than is absolutely necessary on our strategic nuclear deterrent force'. DEFE 13/618, Minute to the PM from the Foreign Secretary, 1 Mar. 1962.

[18] Ibid. The Joint Intelligence Committee thought 5 cities was enough.

[19] See DEFE 13/618, paper on 'The Strategic Nuclear Deterrent' by R.H. Scott, 6 Feb. 1962.

[20] PREM 11/3716, Record of Meeting, 7 Mar. 1962.

[21] DEFE 13/618, Foreign Secretary to PM, 1 Mar. 1962. See also DEFE 13/618 'Notes by the Vice Chief of the Air Staff', 6 Feb. 1962.

[22] PREM 11/3716, Fraser to Thorneycroft, 14 Nov. 1962.

[23] For a discussion of the role of the Royal Navy in the purchase of Polaris see R. Moore, *The Royal Navy and Nuclear Weapons* (London: Frank Cass, 2001).

[24] DEFE 4/160, Confidential Annex to COS (63)(68) th., Part 1, 3 Dec. 1963.

[25] An earlier Soviet system, *Griffon*, was used by the Soviet Union to prove the feasibility of ABMs.

[26] See DEFE 68/21, Brown to the PM, 30 Jan. 1967.

[27] Michael Quinlan, 'The British Experience,' in H. Sokolski (ed.), *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice* (Pennsylvania: Carlisle Barracks, 2004).

[28] See PREM 15/1395, paper by Burke Trend, 10 Nov. 1972. The JIC argued that the ability to destroy Moscow would be enough to deter the Soviet Union.

[29] See DEFE 68/21, Draft Brief for the Prime Minister: Anti-Ballistic Missile Deployment, Undated and DEFE 68/21, 'The ABM Question', Brown to Prime Minister, 30 Jan. 1967.

[30] CAB 168/27, EF/D/01059, Robert Press to Sir Solly Zuckerman ABM/PENAIDS, 23 July 1970.

[31] See J. Baylis, 'Exchanging Nuclear Secrets', *Diplomatic History* 25, Winter 2001.

[32] See PREM 15/1359, Paper on 'Strategic Nuclear Options' by Burke Trend, 10 Nov. 1972. For a time 'Stag' remained the preferred government option.

[33] DEFE 13/548, Note of a discussion between the Secretary of Defence, CA(PR), AC SA(SN), DUS(P) and AUS(POL) on Wednesday 12 Feb. 1969, 12 Feb. 1969. See also CAB 134/3121, Report to the Minister of Technology and Chairman of the Atomic Energy Authority by the Working Party on Atomic Weapons Establishments, July 1968. Known as the Kings Norton report.

[34] For a discussion of the economic costs of *Chevaline* see the 'Ninth Report from the Committee of Public Accounts', v, 9.

[35] Hansard, House of Commons Debates, Fifth Series, Vol. 977, 21 Jan.–1 Feb. 1980.

[36] Hansard, House of Commons Debates, http://www.parliament.the-stationery-office.co.uk/pa/cm198889/cmhansard/1989-02-15/Debate-12.html#Debate-12_spnew28,13 Sept. 2002.

[37] S. Twigge and Len Scott, *Planning Armageddon*, pp.171.

[38] AIR 2/15917, Mills to ACA(Ops), 13 April 1955.

[39] There was no clear idea about which targets Blue Streak would be aimed at. It was felt by strategic planners that this could be left until the missile was deployed. See AIR 2/13206, Menaul to DDOR5, 5 Feb. 1955.

[40] I make the argument in *Ambiguity and Deterrence* that in the late 1940s and 1950s there was some ambiguity in British nuclear doctrine. This centred on the uncertainty which existed between whether deterrence was better achieved through a counter-force or counter-value targeting policy. This, in turn, had an effect on capabilities of the weapons systems developed to achieve deterrence. Sir Michael Quinlan has recently argued that this uncertainty and ambiguity was less prevalent in the 1960s. He points out that: 'Historians of the period have sometimes suggested that the differences of concept between on the one hand a counter-value national plan, and on the other a contribution to the US offensive that was at least partly counter-force, shows a basic and continuing confusion of thought. For all the oscillation of discussion in the early 1950s, this did not necessarily remain the case. There was no incompatibility, and therefore no practical need to choose, between having one concept for the UK-alone hypothesis and a different one for participation in a US effort which, because of its massive scale, could have wider objectives; and though in internal Governmental debate the arguments in favour of maintaining a substantial capability veered between seeking a voice in US plans and decisions and providing a last-resort independent insurance, in logic and practice neither of these justifications excluded the other, or pointed towards divergent provision.' M. Quinlan, 'The British Experience'.

[41] Kate Pyne, 'Dark Horse: A Short History of the Chevaline Project'. This was a paper delivered at the Fourth Charterhouse Conference on British Rocketry, April 2002. This paper remains unpublished and the technical description of Chevaline unconfirmed. I am grateful to Kate Pyne for further information about *Chevaline* in personal correspondence with the author. See also F. Panton, 'Polaris Improvements and the Chevaline System 1967–1975/6, *Prospero*, 1 (Spring 2004).

[42] Hansard, House of Commons Debates, 13 Sept. 2002.

[43] J. Callaghan, *Time and Chance* (London: Collins, 1987), p.553.

[44] The Ministerial Committee consisted of James Callaghan, David Owen, Denis Healey and Fred Mulley. The guidelines of this committee to the Duff-Mason Working Parties was revealed to the author in Confidential Correspondence, 21 May 2002.

[45] Quoted in M. Quinlan, 'The British Experience'.

[46] Ibid. The public debate about nuclear war was rekindled in the early 1980s as a result of the growing tensions associated with the deployment of cruise missiles in the UK and anxieties about what became known as the 'second Cold War'. Quinlan, as one of the most influential figures in the development of British nuclear doctrine in the 1970s and 1980s was himself very concerned about the moral dimensions of nuclear strategy.