

Replacing Polaris

Part 1 The politico-military requirement

The report identifies four interrelated purposes for British strategic nuclear weapons:

1. Numerical contribution to NATO nuclear forces
2. Second centre of decision making
3. Independent defence of national interests
4. Political status and influence

The second and third were considered as the key purposes.¹

1. Numerical contribution to NATO nuclear forces

In 1979 Britain allocated 28 Polaris missiles to SACEUR. One submarine was on patrol with 16 missiles at 15 minutes notice to fire. A further 12 were available on a second submarine. This vessel was normally at Faslane at 24 hours notice to its fire missiles from the berth and at 48 hours notice to take to sea.²

Although it enabled SACEUR to attack 28 targets at long range this force was only a small part of NATO's arsenal of thousands of nuclear weapons. Its significance to the overall NATO nuclear plan was questionable. Michael Quinlan has said the missiles were "notionally" allocated targets in the NATO plan. The Duff Mason report says that the contribution made by British forces to SACEUR's nuclear plan should not be exaggerated.³

The circumstances in which these forces would be released to NATO were limited -

"it is a clear, if necessarily implicit, assumption in our planning that the Polaris force would not be released for use in its NATO role short of a general war involving the United States strategic forces".⁴

The missiles would only have been used against their NATO-assigned targets when it was assessed that there was no need to retain an independent capability. This would not have been the case where there was a limited US nuclear attack on Soviet targets. The British force would probably only have been released to SACEUR if there was a general release of US strategic nuclear forces.

2. Second centre of decision making

The Duff Mason report argues that the significance of the UK's contribution to NATO nuclear forces was not in their size but in the potential for them to be used without US authorisation in defence of Britain's allies in Europe.

¹ Chiefs of Staff Commentary on Duff Mason para 4

² DEFE 25-335 E31 page 2

³ Duff Mason Report Part I para 20

⁴ Duff Mason Report Part I para 20

Duff-Mason recognised that the Second-Centre argument could undermine deterrence by indicating a lack of confidence in the US nuclear commitment to NATO. This concern was probably behind the later formulation of this argument. This said that the UK was confident that the US would use its strategic nuclear forces in defence of Europe. However if the Soviet Union miscalculated this American commitment then they should also know that the UK had the capability of acting independently. This, so the argument went, made it more difficult for the Soviet Union to assess what the response might be – increasing the complexity of and uncertainty in their calculations.

An independent British capability had to be held in reserve in case the United States hesitated about crossing any threshold. This could be the threshold of using nuclear weapons on the battlefield, beyond the immediate battlefield, or against targets in the Soviet Union.⁵ In all these circumstances Britain had to retain an ability to act on its own.

The Duff Mason report recognised the weakness of this argument. If the United States, with its immense nuclear arsenal was not willing to push a conflict to the next level, how could it be credible for Britain, with its far smaller nuclear force, to threaten to do so ?

“It cannot be assumed that (given our much greater vulnerability that the United States to nuclear attack) that a British Government would be readier than the United States President to engage in nuclear escalation that might provoke Soviet retaliation against our territory, even in circumstances in which British forces (like United States forces) might be facing defeat in combat”⁶

The report argued that what was important was that the Soviet Union would not be able to rule out this possibility. It said that this requirement might best be met by an ability to launch limited nuclear strikes which would raise the conflict to a level where the US would be more likely to participate. But yet Polaris and Trident were particularly ill suited for limited strikes.

Duff Mason gives another scenario in which the Second Centre argument would come into play. This is where there was a long-term decline in the US commitment to Europe. Were this to arise then British and French nuclear forces might to a degree replace those of the US. But the British Polaris and Trident systems would not be of any help in this situation. The UK only held enough spare parts at Faslane to operate Polaris for 9 months. Neither Polaris nor Trident could be sustained for long without US support.

3. Independent defence of national interests

The existence of an independent nuclear capability was fundamental to the Second-Centre argument. The Chiefs of Staff said that without an independent capability to inflict unacceptable damage the threat to use nuclear weapons in support of NATO was a bluff and would be seen as such.⁷

⁵ Duff Mason Part I para 23

⁶ Duff Mason Part I para 23

⁷ Chiefs of Staff comment on Duff Mason para 7

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The independent capability was also presented as an insurance against the break up of NATO. However the Polaris and Trident systems, with their dependence on US support, may not have survived any collapse of the alliance.

The report acknowledges that it could be argued that the circumstances in which an independent capability might have been required were so unlikely that they didn't in themselves justify a strategic nuclear capability.

(E) Faced with the situation where the Soviet Union had launched a nuclear attack on Britain there would be no logical reason for British nuclear weapons to be used in response -

"In these circumstances the actual use of our strategic nuclear force in retaliation against the Soviet Union would represent an act of rage and revenge ... there can be no certainty that a Government would take a deliberate decision to launch this act involving the killing of large numbers of enemy civilians but serving no rational purpose".⁸

The credibility of the deterrent rested on the possibility that decision makers in Britain would cast reason and ethics aside -

"Ultimate deterrence is perceived to work, because no nuclear weapons state (NWS) can feel confident enough to act on a judgement that an adversary, seeing the painful destruction of all that he most valued, would withhold retaliation on account of some cool calculation based on ethics and utility".⁹

This approach was echoed in a key document written by the US Strategic Advisory Group in 1995. Essentials of Post War Deterrence recognised that it would be irrational for the US to use nuclear weapons in response to conceivable threats that it might face in the future. So it proposed that it would be helpful if it appeared that US decision-makers could lose their sense of reason -

"That the US may become irrational and vindictive if its vital interests are attacked should be part of the national persona we project to all adversaries".¹⁰

One of those who could have ordered a British nuclear attack in the 1960s was Dennis Healey. Harold Wilson had appointed his Defence Secretary as his substitute, with authority to release the V bombers if the Prime Minister's bunker was destroyed. When asked what he would have been done when faced with a Soviet nuclear attack, Healey replied:

"I would have said that there is no reason for doing something like that. Because most of the people you kill would be innocent civilians."¹¹

⁸ Duff Mason part I para 11

⁹ Duff Mason part I para 12

¹⁰ Essentials of Post War Deterrence, Strategic Advisory Group, 1995, obtained under the FOIA by Hans Kristensen.

¹¹ HMS Apocalypse, Peter Hennessy & Richard Knight, Daily Mail, 29 November 2008.

It would

Field Marshall Lord Carver, former Chief of Defence Staff, ~~ridiculed the idea of an~~ independent British nuclear attack ~~saying that it~~ would be either suicide or a voice from the grave.

4. Political status and influence

Both the Duff Mason report and the Chiefs of Staff commentary stress what might be lost if Britain were to give up its status as a nuclear power. The report argued that nuclear weapons were important for Britain's standing in Europe. They meant that Britain had a special place, close to the US, within NATO. The Chiefs of Staff said that without nuclear weapons Britain would be in a lower position within the Alliance than Germany.¹²

There was clear concern that this would also leave France as the only nuclear-armed power in Europe. As an earlier document pointed out, passing nuclear hegemony to the French was something which the British Government did not want to contemplate.¹³ Field Marshall Carver had been critical of any attempt to justify British nuclear weapons on these grounds.

Part 2 Criteria for deterrence

In 2007 the MoD withdrew the second part of the Duff Mason report from the National Archives on grounds of national security. However it is possible to piece together some of its contents.

Four options were set out:

1. To destroy the command centres of the Soviet political and military systems (both above and below ground) inside the Moscow ring road and extra ones in the wider Moscow area.
2. To inflict a level of damage that would cause the breakdown of normal life in Moscow, Leningrad plus two more big cities.
- 3a. To inflict breakdown on 10 big cities West of the Urals, including Leningrad.
- 3b. To inflict lesser damage on 30 big targets (also including Leningrad).¹⁴

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While these options were illustrative the Chiefs of Staff said that they were likely to become the measure against which future requirements were judged.

The report said that any of the four options would constitute an unacceptable level of damage.¹⁵ However the Chiefs of Staff challenged this assumption. They argued that there would be circumstances when Option 3b would be insufficient. Their

¹² Chiefs of Staff Commentary on Duff Mason para 12

¹³ TNA DEFE 19-208 E05-2 page 2

¹⁴ These options are set out in Cabinets and the Bomb page 324. In a footnote Peter Hennesey says that this was "private information" that he had obtained. Options 1 and 3b are confirmed in Archive papers.

¹⁵ Duff Mason report Part 2 Annex A Unacceptable Damage para 10

commentary points out that in the Second World War the Soviet Union sustained over 20 million casualties and then says “if a crude criterion of megadeaths is applied ..”. The phrase following this has been redacted. Given the context it is likely that it said that the fatality estimate for Option 3b was not high enough to deter the Soviet Union.

In July 1979 preparations were being made for a visit to Washington to discuss nuclear issues. Commodore Hill submitted comments on a briefing for this visit. He pointed out that some of the content of the Duff Mason report had been drafted to suit the previous Labour Government. In this context he said – “as a particular point the Chiefs of Staff have reservations about criteria option 3b (30 bangs on 30 cities)”.¹⁶

The minutes of a Chiefs of Staff committee meeting in August 1979 confirm this –

“Should the point arise, you may wish to remind colleagues that Option 3(b) (30 bangs in 30 places) is a surviving fragment of the so called “Owen Criteria” of “a million dead” which was to support the case for a cruise missile option”.¹⁷

This suggests that the megadeath figure which the Chiefs of Staff had dismissed as insufficient was of the order of one million fatalities.

Option 1, an attack on command posts in the Moscow area, was described as “the loss of governmental control, with great collateral damage”.¹⁸ The Chiefs of Staff favoured this option. They argued that it was suited to many circumstances, including “advanced escalation”. This refers to the situation where a lower level of nuclear response had failed. In comparison with the other options, attacking the command centres would leave the Soviet Union most vulnerable to an attack from the United States or China. It is likely that the Duff Mason report itself also favoured Option 1. *1 - sep*

In due course Option 1 became the basis for targeting Trident. Field Marshall Nigel Bagnall said “It is more than just the destruction of Moscow, it is the destruction of their command and control system”¹⁹. Richard Mottram had been the secretary of the Duff Mason Committee and he later became Permanent Under Secretary at the MoD. In an interview in January 2008 he said that the policy meant “threatening where the key players in Soviet Government operate from”.²⁰ Michael Quinlan has made statements which are consistent with targeting the command bunkers, although he has avoided stating this clearly. He has pointed out that the ABM system protected more than just Moscow and that Britain’s deterrent would be undermined if these other objects were immune from attack.²¹ The official phrase used in the 1980s to describe the nuclear targets was “key aspects of Soviet power”. *→ from p. 25*

Part 2 of the Duff Mason report included an Annex with the title “Unacceptable Damage”. This document is in the public domain. However in 2007 the MoD reclassified it so that it is no longer available to the public in the National Archive.

¹⁶ Letter from Commodore Hill to CDS 12 July 1979, DEFE 25-335 E82

¹⁷ Minutes of Chiefs of Staff Committee 21 August 1979, DEFE 25-335 E100;

¹⁸ Chiefs of Staff Commentary on Duff Mason para 15

¹⁹ Moscow Criterion, BBC, Broadcast July 1995

²⁰ Recording of PONI interview with Richard Mottram, 15 min 40 secs.

²¹ Seminar on Cabinets and the Bomb.

The annex identifies four key capabilities that might be attacked:

1. Governmental capabilities
2. Military facilities
3. Military research, development and production and general industrial capabilities
4. Generalised destruction

Capabilities 2 and 3 were dealt with briefly. It was felt that an attack on military facilities would not in itself cause unacceptable damage, although such attacks were not ruled out. It was acknowledged that Britain could not present an effective threat to Soviet missile silos. It was also felt that the loss of even carefully selected military-industrial capabilities in the Soviet Union would not be decisive.

In assessing the significance of Governmental capabilities the annex argues that the construction of command bunkers in and around Moscow, protected by the ABM system, was a sign of the high value placed by Soviet leaders on the survival of their centralised administrative system. In addition to bunkers within Moscow there were a large number of underground facilities around the city. 27 of these were believed to be for the use of the national political and military leadership and for operational control of Soviet armed forces. A map of the national-level command and control bunkers was attached to the Annex. This pinpointed 7 sites outside the Moscow Ring Road. Some of these, such as Sharapovo and Checkov, are not single facilities but complexes of bunkers spread out over large areas. These parts of the annex were clearly linked to Option 1 – an attack on command centres.

Most of the annex deals with the fourth heading, generalised destruction. This describes attacks on cities. Such attacks would destroy not only military and industrial facilities in the area but would also “threaten more general damage to the infrastructure of Soviet society and widespread civilian deaths and casualties”.²² It was argued that the Soviet Union placed particular value on some cities, particularly Leningrad and Moscow.

The existing basis for calculating how much damage should be inflicted on a city in a nuclear attack was described:

“the damage criterion used is based not on destroying the whole city or killing a specified number of people but instead on creating sufficient damage to bring about the breakdown of the city as a functioning community. Our present plans assume that, to achieve this, 40% of the target area should suffer severe structural damage (SSD) – that is, its unhardened buildings should be so damaged that they could not be used for their intended purpose without essentially complete reconstruction.”²³

²² Duff Mason report Part II Annex A para 4

²³ Duff Mason report Part II Annex A para 5

The results of such an attack would be –

“at least 40% of those in the city at the time of the attack would be likely to be killed outright, a further 15% might be so seriously injured that they needed to be treated in hospital, and another 15% might suffer light injury”.²⁴

In the annex these existing criteria for Unacceptable Damage were reviewed. The conclusion was that the 40% irreparable damage figure remained appropriate. However if this was very difficult to meet a somewhat lower figure could be acceptable.

The authors of the annex were concerned about Soviet plans to build shelters for essential workers and that by 1985 there could be shelters for 30% of the population. Their response was to evaluate the effect of detonating warheads as a ground-burst rather than airburst. This would half the area subject to major blast damage, but would greatly increase the danger from radioactive fallout. The effect of using the same number of warheads as originally projected, but in ground-bursts rather than air-bursts, is described for the city of Leningrad–

“in near-still-air conditions ground-bursts would subject 55-60% of the city to a radiation dose sufficient to cause rapid debilitation followed by death for most people in the area, and to contaminate food, water, air and both damaged and undamaged buildings. Residual radiation would remain a hazard for many years to come. If there was a wind, the fall-out would be carried beyond the city limits to extend the hazard to people locally dispersed.”²⁵

The annex argued that so long as Britain had the option of detonating warheads as a ground-burst, the Soviet Union could not rely on civil defence as a means of countering the British nuclear deterrent.

Part 3 System options and their implications

This section is not currently available in the National Archive. It contained an assessment of the number of warheads that would be delivered to meet each of the four damage criteria options. Although the official figures are not in the public domain, the Unacceptable Damage annex provides a basis for calculating approximate values. The following is an estimate of Trident warheads delivered for each alternative:²⁶

Option	Targets	Warheads delivered
1	Command centres in and around Moscow	86 60-80
2	Breakdown of Moscow, Leningrad & 2 other cities	43 30-60
3a	Breakdown of Leningrad & 9 other cities	42 30-60
3b	Lesser damage on 30 big targets	30

²⁴ Duff Mason report Part II Annex A para 5. This assumes a uniformly distributed population.

²⁵ Duff Mason report Part II Annex A para 8

²⁶ Assuming irreparable damage is equivalent to 7 psi overpressure, 22 100-kiloton warheads would be required for 40% irreparable damage to Moscow and 13 for Leningrad. Other cities may have required 3 or 4. The option 2 estimate was doubled to produce the figure for option 1. Calculations carried out using the Lawrence Livermore programme Weapons Effects.

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These are not figures for the number of warheads that would be deployed, but the number that would reach their targets. For options 1 and 2 this would be after many of the warheads had been destroyed by the ABM system around Moscow.

The Chiefs of Staff commentary says that the number of warheads that would be delivered for Option 1 was about double the number for any other option. This is significant, given that this was the option that was adopted for Trident. Attacking the bunkers would require twice as many warheads as attacking Moscow, Leningrad and two other cities in Option 2. In Option 2 it is likely that only around half of the delivered warheads would have been targeted on Moscow. So an attack on the bunkers would require four times as many warheads to be delivered as an attack on the city of Moscow alone.

This should be put in the context of the targeting of Polaris and Chevaline. A briefing on Chevaline for Ministers in 1979 said:

“Plans for the UK strategic deterrent in its national (as distinct from NATO) role are based on the assessment that the threat to inflict unacceptable damage on the Moscow area is required.”²⁷

Chevaline relied on swamping the ABM system with a large number of decoys. So it was not particularly suitable for a simultaneous attack on Moscow and other cities. Targeting Polaris on cities other than Moscow was an alternative if the missiles could not penetrate the ABM system.

An attack on the bunkers in and around Moscow, with four times more warheads, would have been different from an attack on the city itself. The scale of blast damage inside the city would have been less. But there would be colossal long-term effects from radioactive fallout because the attacks would almost all have been ground-burst rather than air-burst. As their own analysis for ground-burst strikes on Leningrad showed, the number of deaths could be higher.

Some of the bunkers were inside Moscow, others were on its periphery, and some further away. The map attached to the Duff Mason report shows that they were planning to target bunkers on 3 sides of the city. This meant that, unless the wind was from due North, fallout from some of these strikes would drift downwind into the city.

Michael Quinlan has claimed that there was an ethical dimension to the change away from deliberately targeting cities:

“The central idea in such plans would be to inflict disabling damage upon the aggressor state as a state, so as to remove or emasculate its ability and disposition to persist as an evil force against others, while keeping as low as possible (appallingly grave though that would probably still be) the harm done to innocent civilians”.²⁸

²⁷ Briefing for new ministers, Brief no 9: Strategic and theatre nuclear forces, 2 May 1979. DEFE 25-335 E58 (i) para 5

²⁸ Thinking about nuclear weapons, Michael Quinlan, RUSI Journal, December 1997.

The reality, as they knew, was that the “great collateral damage” from attacking command bunkers would cause at least as many casualties and far more long-term environmental damage.

US Trident missiles with 100-kiloton warheads are not sufficiently accurate and powerful for a single warhead to produce a high probability of destroying a hardened installation. So it is possible that the calculations for Option 1 were made on the basis of using two or more Trident warheads against around 40 bunkers. The Commentary notes that because Cruise Missiles were more accurate, fewer delivered warheads were required for a system based on Cruise than for one based on Trident.²⁹

Having come up with how many warheads would be delivered in each scenario, the Duff Mason report then considered the effects of defences, such as the ABM system around Moscow. The drafting of the Chiefs of Staff commentary provides an insight into the significance of this for their final warhead estimates. The original draft said:

“A limit on UK warheads based on four boatloads of POLARIS, with a nominal 3 warheads per missile, would be disastrous if carried over to TRIDENT C4 with 8 warheads per missile.”³⁰

The Vice Chief of Naval Staff wanted this changed, but ^{to - (add VCNA note) his} the amendment was rejected with the following comment: / - done

“VCNS’s rewording is trying to explain, in shorthand, a very complex calculation concerning Chevaline decoys, Polaris Re-entry bodies, MIRVs and ABM, which has led Duff-Mason to recommend a very large increase in warheads for the Successor after Chevaline”.³¹

(a major point)
This suggests that the very large increase in warhead numbers, which is apparent from the Chiefs of Staff commentary, was due primarily to estimates of how many warheads would have been destroyed by the ABM system.

The number of warheads required was substantially less where the targets were not protected by the Moscow ABM system.³² The commentary says that a single submarine carrying 128 Trident warheads would only have been able to carry out options 3a and 3b. For options 1 and 2 two submarines would have been required. On this basis it was argued that 5 submarines would be required with 2 on patrol at all times. These two submarines could have carried 256 warheads in total.

In 1982 Britain switched from ordering the C4 missile to the much larger D5 system. C4 could only carry 8 warheads, whereas D5 could take more than 12. Britain insisted that the US provided the capability to arm each D5 missile with 12 warheads. This created problems for the US as they were restricting their own missiles to 8 warheads each as part of the START treaty. British missiles were kept well out of the START treaty so that they could be armed with 12 warheads.³³ This would have

²⁹ Chiefs of Staff Commentary on Duff Mason report para 21

³⁰ Chiefs of Staff Commentary on Duff Mason report para 35

³¹ Brief by D of DP(C) on VCNA amendments, DEFE 25-335 E100

³² Chiefs of Staff Commentary on Duff Mason report para 23

³³ PONI Interview Franklin Miller I 18 min 00 secs.

meant that a single submarine was carrying 196 warheads. This high figure is consistent with the Commentary on the Duff Mason report, based on pessimistic estimates of the future effectiveness of the Moscow ABM system.

Part III of the Duff Mason report considered a range of delivery systems. They eliminated all options except submarine-based systems. They considered in detail both submarine-launched ballistic missiles (SLBM) and Cruise Missiles. David Owen had presented a detailed paper with the case for Cruise. The main argument against Cruise was that the MoD could not predict the proportion of missiles that would reach their target. It might be anywhere between 1:10 and 9:10. Their estimates appear to have used the most pessimistic assumption. It was then argued that a large number of submarines would be required to deliver these missiles.

Consideration of British Long Ranged Theatre Nuclear Forces

At the same time as discussions were taking place on replacing Polaris with Trident, separate consideration was being given to the need for NATO to have more Long Range Nuclear Forces. In 1979 Britain was considering not only being a host for US Ground Launched Cruise Missiles, but also whether to develop a British version. In this context Cruise was not an alternative to Trident, but an addition to it.

The US argued that NATO needed intermediate nuclear forces, between tactical and strategic forces. These were to provide a capability for controlled nuclear escalation. The jump from using nuclear weapons on the battlefield to a strategic nuclear exchange was considered to be too wide to be credible. Long Range Theatre Nuclear Forces (LRTNF) would provide an intermediate response. The proposed systems were Ground and Submarine-Launched Cruise Missiles and Pershing ballistic missiles.

Until the early 1980s Britain had a LRTNF capability, in the form of V bombers assigned to NATO. In 1979 these aircraft were approaching the end of the life. In considering whether Britain needed its own future LRTNF a number of arguments were presented which relate to the Polaris replacement decision and to the future of British nuclear weapons today.

A paper promoting this new force said:

“there are many things they could do ~~to us~~ which would be too severe for (say) a Tornado strike on Poland to be an adequate response but not severe enough for a Polaris strike on Moscow (brining annihilation upon us).”³⁴

Polaris was not considered to be appropriate for a limited nuclear strike. The association of Submarine-Launched Ballistic Missiles with a strategic exchange meant that they were unsuitable for more selective functions.³⁵ Firing one or two missiles would expose the submarine to strategic attack.

³⁴ DUS(P) paper on LRTNF 1979, DEFE 25-335 E69 (0) page 1

³⁵ DEFE 25-335 Annex A page 6

“the threat posed by the UK Polaris force of massive retaliation against cities is credible only in response to the threat of strikes of a comparable scale and nature. ... Use by the UK of this force in response to Warsaw Pact conventional or limited nuclear aggression which was unlikely to threaten immediately the continued existence of the UK, would be deterred by the threat of massive strategic retaliation by the Soviet Union against the UK.”³⁶

The preferred British LRTNF option was US Ground-Launched Cruise Missiles armed with UK warheads. But the proposal for new force ran into problems from the start. The Chief of Defence Staff was in favour of a modest replacement for the V bombers, but the heads of the three services were ^{all} opposed to ^{the} a new force.³⁷ The Naval staff argued that estimates of future warhead production at Aldermaston were exaggerated and it would not be possible to add an additional 100 warheads for LRTNF to the existing programme. The priority nuclear programmes at the time were Chevaline, a replacement for WE-177 and the successor to Polaris.

Soviet ABM development and Polaris/Chevaline

In order to put the targeting plans proposed for Trident into context it is necessary to explore the development of ABM defences around Moscow and their impact on the targeting of Polaris and Chevaline.

The capability of Polaris was described in the following terms in 1974 –

“the 16 missiles held at readiness ... are capable of delivering well over 30 warheads on [redacted]”³⁸

There remains some uncertainty over exactly how effective Chevaline was against Galosh and SH-04. Chevaline is believed to have included 27 decoys as well as its two warheads. Each decoy was also supported by chaff. The system deployed the decoys, chaff and warheads within an area described as a threat tube. In 1974 it was argued that there was little room to relax the exchange rate performance below the stated requirement of 15.³⁹ In comparison with Poseidon the system was only marginally different when faced with an ABM force of 200- 300 exo-atmospheric missiles. Faced with smaller numbers it was marginally better.⁴⁰ Poseidon had an exchange ratio of 10.⁴¹

³⁶ A study of a possible new UK contribution to a NATO Long Range Theatre Nuclear Force, Report by the Directors of Defence Policy, 1979, DEFE 25-335 E64 Annex A page 12f

³⁷ Chief of Defence Staff statement to the Defence Secretary on LRTNF, 1979, DEFE 25-335 E69(i) page 2f

³⁸ Defence Review, Strategic Nuclear Deterrent DEFE 19-208 E5-2 page 3f

³⁹ DEFE 19-190 E21

⁴⁰ DEFE 19-190 E20 page 2

⁴¹ DEFE 19-190 E14 page 3

At one point it was suggested that 4 of the decoys could be removed. It was predicted that this would have resulted in a loss of 0.4 of a penetration.⁴² A 1979 report said:

“Russia would have to deploy at least 10 Galosh for each incoming missile to be certain of destroying the two re-entry bodies within the threat tube.”

The development of SH-04 as a replacement for Galosh was expected to only marginally enhance the effectiveness of the Soviet ABM system.⁴³

The Soviet Union began testing an endo-atmospheric missile that could intercept an attacking RV in the final stages of its trajectory. This was designated SH-08 or Gazelle. A few British Government documents refer to this as SPRINTSKI. Sprint was the name for a similar US ABM missile.

In 1974 a report suggested that Chevaline would have no capability against SPRINTSKI.⁴⁴ It was not designed to be effective against such terminal defences. All the decoys burnt up on re-entry.⁴⁵ The Chevaline RVs were also relatively slow because of their blunt shape. This was probably because of their large warheads. An alternative lightweight warhead was developed. In due course it was to be crucial for the Trident programme, but there was initial interest in its use on Chevaline. It could have been fitted into a more pointed high-speed RV.⁴⁶ There was a provisional plan to introduce the replacement warhead on the third submarine to be armed with Chevaline, but in 1979 it was decided not to go ahead because it would delay the whole Chevaline programme. The option of replacing the warheads at a later date was left open.⁴⁷ It was felt that SPRINTSKI was unlikely to be deployed before the late 1980s. Even then –

“as long as the Moscow ABM system remains within the numerical limits of the ABM Treaty, one boatload of Chevaline missiles should still achieve on average sufficient penetration to inflict critical damage on the built-up area of Moscow.”⁴⁸

Another report the same year said that SPRINTSKI could be operationally deployed in 5 years. It added -

“It would only be when, and if, the total system were operationally deployed that we would forecast a significant, but not catastrophic, reduction in Chevaline effectiveness”.⁴⁹

⁴² DEFE 19-191 E24-2 page 3

⁴³ DEFE 25-335 E45 page 4

⁴⁴ “the statement that there would be no capability against SPRINTSKI needed further examination”

Notes of meeting on 2 September 1974. DEFE 19-208 E46 -0

⁴⁵ DEFE 19-191 E17-2 page 5

⁴⁶ DEFE 25-335 E37 page 1

⁴⁷ Report on Chevaline from the Chief of Naval State to the Defence Secretary, 12 January 1979, DEFE 25-335 E45 page 3

⁴⁸ DEFE 25-335 E45 page 4

⁴⁹ DEFE 25-335 E63 page 3