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THE MODERNIZATION OF THE SEA-LAUNCHED BALLISTIC MISSILE FORCES

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BY

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# TABLE OF CONTENTS

I. Introduction

II. The Trident Missile System and U.S. Nuclear Modernization
   A) The Soviet Sea-based Force Configuration
   B) Reagan Defense Budget Priorities and the Trident System
   C) The Trident System, American Strategic Doctrine, and Counterforce Capabilities
   D) U.S. and Soviet Anti-submarine Warfare Capabilities
   E) C3I Systems and Submarine Forces

III. British Nuclear Modernization and the Trident System
   A) British Security Policy and the Nuclear Deterrent
   B) The Selection of the Trident System
   C) The Opportunity Costs of the Trident Program
   D) Rationale Behind the Maintenance of the British Deterrent

IV. Modernization of the French Sea-based Nuclear Forces
   A) The Modernization Plans Under Mitterand
   B) French National Security Policy and the Force de Dissuasion
   C) The Credibility of the French Strategic Nuclear Forces
   D) Problems and Trends of the 1980s

V. Conclusion

VI. Notes

VII. Bibliography
The world milieu is increasingly beset by larger, more sophisticated, and more dangerous nuclear weapon arsenals. While American plans to modernize the land-based missile forces and NATO plans to modernize its long-range theater nuclear forces have received extensive domestic debate and inquiry, significantly less internal discussion has been generated over the modernization of the sea-based components of the American, British, and French nuclear forces.

Moreover, literature assessing the impact of the M-X and the new long-range NATO missiles on stability and the balance of power in the European theater, U.S.-Soviet relations, and prospects for future arms control is voluminous. A seemingly smaller body of current deterrence analysis surveys the possible implications of the proposed sea-based weapon systems. Furthermore, public scrutiny has been scant. Similarly, professional attention has at least been momentarily diverted to more politically volatile weapon systems such as the MX.

This paper is written in the hope of compensating for this neglect by providing a broad overview of the current plans to modernize the sea-launched ballistic missile forces of the United States, Great Britain and France. Given the enormity of the resources involved and the strategic ramifications that will probably ensue from these systems, prudent consideration of their underlying national security rationale is of primary importance. It is the belief of this author that if the citizens of a representative democracy are to be expected to sacrifice vast sums of government expenditures in order that additional nuclear forces can be procured,
the same citizens should be able to observe a measurable increase in the
security of their nation. If an enhancement of security does not seem
likely or even plausible from substantial increments to the West's stra­
tegic nuclear forces, other avenues for security enhancement such as arms
control and mutual force reduction should be pursued with greater commit­
ment and vigor, with more creativity, and without the presumption that suc­
cessful negotiations over weapon systems entail a "zero sum" game strate­
gem.

If it seems apparent in the final analysis that the Western powers
are not following the most optimal procurement strategy, respective
of their goals and security requirements, what in turn does this reveal
about the decision-making and goal selection process behind weapons acquisi­
tion? Such questions are more than pertinent as world expenditures on
arms and particularly on nuclear weapon systems are expected to rise annual­
ly without abatement during the 1980's.
THE TRIDENT MISSILE SYSTEM AND U.S. NUCLEAR MODERNIZATION

The Trident submarine and missile system together compose a major portion of the proposed modernization of the U.S. strategic nuclear triad. If the Reagan administration succeeds in implementing its entire "rearmament" package, the other two legs of the American triad will also undergo extensive modernization. One hundred M-X ICBMs each with ten MIRVed and highly accurate warheads will be added to the already formidable Minutemen force. Further, the air-launched component of the triad will receive one hundred B-1B strategic bombers and the credibility of the B-52 force will be significantly improved with the deployment of over 3000 air-launched cruise missiles on these bombers.

The modernization of the sea-based component of the triad will most likely consist of at least thirteen Trident submarines initially equipped with Trident (I(C4) missiles and later to be retrofitted with more accurate Trident II(D5) missiles. Additionally, significant advances in American anti-submarine warfare (ASW) capabilities, perhaps most exemplified by the procurement of the Los Angeles class SSN (nuclear powered attack submarines), form an integral part of the modernization of our sea-based forces.

Research and development on the Trident system began in the early 1970s. Trident was specifically designed to replace the Polaris system which by the middle 1980s would be approaching the end of its operational life. From its very inception, the Trident system, which would incorporate costly state-of-the-art technology, generated internal Defense Department controversy over the program's cost and extravagance. In fact, "The Trident submarine and missile is, next to the MX, the most expensive weapon system
ever conceived. Many analysts contended that the system contained "a serious imbalance between the technical characteristics of the weapon system and the comprehensive military requirements. In size, speed, and cost, the Trident exceeds objectively defendable standards."^2

The eventual choice of a large and sophisticated boat was largely the result of internal Navy politics, with Admiral Rickover prevailing with a design for a large boat that would allow advanced nuclear reactor technology developed under his auspices to be employed. While the more extreme variants were eliminated by the Navy at Deputy Secretary of Defense David Packard's insistence, Packard nonetheless succeeded in deferring "new submarine construction until "the early 1980s," and to put the Trident I missile on existing boats, an option, long in development. . . , that had been opposed by the Navy."^4

Despite Packard's apparent success at curbing the navy's profligacy, . . . The Navy demanded that the accelerated rate of development of the Trident submarine, adopted as a "bargaining chip" during SALT negotiations, be sustained in exchange for its support of the SALT Treaty. Moreover, the President sought to use the Trident as a future bargaining chip with the Soviets and a means of placating domestic critics of the treaty. In the end, the Navy's version of the boat was approved. The existence of a realistic option and the support of some anti-Rickover factions within the Navy had failed to create the conditions for a successful move toward lower-mix weapons. 5

Before the introduction of the first Trident submarine into the naval nuclear force structure in 1981, the U.S. SLBM force consisted of ten Polaris submarines equipped with 16 missiles carrying three relatively large MRV warheads, and 31 Poseidon submarines, each equipped with 16 MIRVed missiles carrying an average of ten relatively small (ten kiloton) warheads.
Hence, subsequent to the SALT II negotiations, the U.S. SLBM force consisted of 656 missile launchers with over 5400 warheads. Extensive MIRVing throughout the submarine fleet had enabled the United States to deploy over twice as many warheads on this platform as were deployed in the American ICBM force. Moreover, the number of American sea-based warheads was approximately equivalent to the total number of Soviet strategic warheads of all types.\(^6\)

The Polaris A-3 and Poseidon 3-C missiles, from their initial deployment, have clearly remained retaliatory weapons with only countervalue capabilities. The Polaris missiles have a range of 2500 nautical miles and the warheads have a circular error probably (CEP) of approximately 3000 feet. The Poseidon missiles which have the same range, contain warheads of greater destructive capability given a CEP of 1800 feet.\(^7\) The Trident I (C4) missile with eight MIRVed warheads is subject to nearly the same capability limitations because of its CEP of 1500 feet, only for the reason that the technology necessary to give American SLBMs a counterforce ability has not yet reached the procurement stage. However, the increased range of the Trident I—4000 nautical miles—provides for a great deal more operational flexibility, as this range will provide a major portion of the U.S. SLBM force with the capability of striking Soviet targets while situated in American territorial waters.\(^8\) Twelve Poseidon submarines are scheduled to be retrofitted with the Trident I during the early and mid-1980s. Trident submarines constructed before the procurement of the Trident II D5 missile will also be equipped with the Trident I.
The Soviet Sea-based Force Configuration

Any cogent discussion of American sea-based nuclear capabilities must necessarily include a discussion of the commensurate Soviet capabilities. Although the Soviet Union does deploy a strategic nuclear triad similar to the United States, the relative potencies of the three Soviet "legs" vary significantly, from those found in the U.S. nuclear force structure. In fact, great asymmetries continue to exist between the two force arrays. A delineation of the static force levels of the two adversaries, with their commensurate destructive capabilities, aptly demonstrates the predominance of the Strategic Rocket Forces in the Soviet force configuration. The following levels existed at the time of the signing of the SALT II treaty:

<table>
<thead>
<tr>
<th></th>
<th>United States (in percent of total forces)</th>
<th>Soviet Union (in percent of total forces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missile launches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICBMs</td>
<td>27.0</td>
<td>70.75</td>
</tr>
<tr>
<td>SLBMs</td>
<td>22.5</td>
<td>21.75</td>
</tr>
<tr>
<td>Strategic Bombers</td>
<td>50.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Megatonage</td>
<td>49.4</td>
<td>77.3</td>
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<td></td>
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<td>14.7</td>
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The Soviets have clearly emphasized the deployment of stationary ICBMs
which are more reliable and accurate, yet increasingly vulnerable to pre-emptive attack. As a result of continued heavy investment in ICBM development, the most ominous components of the Russian ICBM force, "the SS-18 and the SS-19 have, in the last two years, achieved accuracies (measured in CEP) approaching the American Minuteman III--about 1200 feet."\(^\text{10}\)

While this trend has caused many American strategic theorists to be concerned over the theoretical capability of these Soviet missiles to destroy a high percentage of the American Minuteman force in a first-strike attack, one must be careful not to posit strategy from mere theoretical capability. Rather than a desire to achieve a credible first-strike potentiality, it is more likely that the Soviet nuclear force configuration has resulted from the dominant role of the Strategic Rocket Force in military budget allocations (e.g., the SRF has operational control over all land-based missile forces with ranges exceeding 1000 miles). Furthermore, Soviet submarines and SLBM technology and ASW technologies are estimated to be relatively inferior to their Western counterparts which seems to have precipitated a Soviet resistance to rely on these systems to the same extent as the United States.

By early 1981, corresponding to the deployment of the first Trident submarine, the Soviet SLBM force consisted of 71 SSBNs with 955 missile launchers. The launchers were equipped with SS-N-5, SS-N-6, SS-N-8, and SS-N-18 missiles for a total of 1739 warheads (in comparison the U.S. total was 5344).\(^\text{12}\)

The overwhelming American preponderance in sea-based warheads is not destined to be of long duration. The Soviets are currently in the process
of rapidly redressing the 3 to 1 American advantage. While Soviet MIRV technology has been already incorporated extensively into the ICBM forces, MIRVing of the SLBM forces has lagged considerably behind. Less sophisticated MRV technology, which does not permit independent targeting of the missile's warheads, was used in the deployment of over 500 SS-N-6s, which still comprise about half of the Soviet SLBM force.\textsuperscript{13}

But MIRV technology is no longer the exclusive domain of the SRF. By 1979 the Soviets had deployed eight new-generation Delta III-class submarines fitted with 16 SS-N-18 MIRVed missiles each containing one warhead or 3-7 MIRVed warheads.\textsuperscript{14} The SS-N-18 was the first Soviet MIRVed SLBM and it has been tested in three varieties thus providing a good deal of targeting flexibility: three warheads of 200 Kt each with a range of 6500 km; a single warhead of 450 Kt with a range of 8000 km; and seven warheads with much smaller yields with a range of 6500 km.\textsuperscript{15}

At least nine more Delta III-class submarines have been deployed since 1979. A newer SLBM, known in the West as the Typhoon, will soon be deployed carrying a larger number of warheads with accuracy improvements over older Soviet systems. Moreover, "With a production rate of some six SSBNs a year, . . . [the Soviet] force . . . could consist almost entirely of Delta-class and new Typhoon boats by 1985."\textsuperscript{16}

Indeed, Soviet SLBM capabilities are expanding quantitatively and qualitatively. For instance, the increased range of the SS-N-18 missile enables Delta III submarines to operate in the relatively safe waters of the Barents Sea and the Sea of Okhotsk.\textsuperscript{17} But is the Soviet rate of progress as alarming as the Reagan administration would have us believe? A multitude of factors, to be pondered later, deserve careful attention before
Reagan Defense Budget Priorities and the Trident System

Reagan's proposed budget for fiscal year 1983 requested $3.8795 billion for further research, development, and procurement of the Trident system: $2.77 billion was requested for the 10th and 11th Trident submarines, $742.8 million for the production of 72 Trident I missiles, and $366.7 million to continue development of the Trident II missile. This total compares with the $4.46 billion requested for MX development and the $6.3482 billion earmarked for strategic bomber modernization. Total obligatory authority for the Department of Defense would rise to $257,469 billion -- a "real" increase of 13.1 percent and annual authorization was required for approximately $183,457 billion.18

Although the Senate and House budget committees deleted about $3.2 billion for Reagan's request, funds for the Trident system remained relatively unscathed. Development of the Trident system, including the expensive, highly accurate Trident II D5 missile (research and development costs alone to exceed $8 billion) continues to be one of least controversial components in Congress of the administration's strategic modernization plan.19

Communication systems to improve C3I linkages to SSBNs were also approved without detraction. A powerful underground radio antenna (called ELF) able to communicate with deeply submerged SSBNs was approved by both Congressional panels as was the procurement of two Hercules transport planes which can communicate with submarines if they are close to the ocean's surface.20

Ample funding was also approved for ASW platforms. Two SSNs of the
Los Angeles class ($1.027 billion) and the components to build three more in each of the following two years were requisitioned and approved. Both Congressional panels also sanctioned the "continued production of the two helicopters which are the principal anti-sub weapons of all of the Navy's surface warships . . ." 21

However, Reagan's defense budget increases, at least initially, for FY 1982, "almost all . . . went for conventional arms, not for the purchase or speeding up of strategic weapons systems." 22 In fact, the proposed funding for the Trident system even decreased from that proposed in the Carter FY 1982 budget ($2.8697 billion to $2.8096 billion). 23

As mentioned earlier, proposed Trident funding soared $1 billion for FY 1983 largely because of the ordering of two more Trident submarines. Funding for other strategic nuclear force platforms were of course the "focus of considerable activity, . . ." as they were "down for $23.1 billion in the new budget." 24

The final budget approved by the House and Senate for FY 1983 further reduced the defense bill's total authorizations from $180.3 billion to $177.1 billion. The largest single reduction, $699 million, was from the Trident submarine account thereby removing funding of one submarine. After submitting the budget, the administration had decided to equip the 10th and 11th Trident submarine with the heavier and more-costly Trident II D5 missile (not scheduled for deployment until 1989), which would increase the cost of these boats. 25

The substantial reduction in Trident system funding for FY 1983 did not signal a Congressional softening of support for the program despite the
destabilizing factors the D5 missile may introduce into the strategic balance. Rather, "There appeared to be little support for the argument that the United States should not build weapons so fast and accurate that they could threaten a surprise attack on Soviet command posts and missile launchers." A motion from Thomas J. Downey, D-N.Y. to cancel further development of the Trident II missile because of its potentially destabilizing features, was resolutely defeated 89-312. The locus of Downey's argument was the ramification of deploying a missile with potential land-target capabilities on a stealth-like platform such as the Trident submarine. He contended that because the Trident II could be, 

... launched from submarines much nearer their targets than are U.S. land-based ICBMs, it could destroy them in only 6-8 minutes, compared to the 30 minutes it would take for a land-based missile to attack the same targets.

As a result, ... , the Russians would have to put their missiles "on the hairiest of hair triggers," for fear that if they were not launched at the first sign of a U.S. attack, they would be destroyed. This would dangerously increase the risk of accidental nuclear war, ... U.S. warning systems had given hundreds of false claims, ... but "because we had the time afforded by the 30 minutes, ... we had the time to go to the computer and sort that out."

"Believe it or not, ... we do not want to rob the Soviet Union of warning time." 28

Downey's reasonable argumentation persuaded only a small minority of House members. Concerns over the United States appearing to self-impose unilateral constraints on the qualitative development of its strategic systems, without any assurance that the Soviet Union would follow a similar course, provided a foundation for incredulity on the part of many House members. 29

Overall, the Reagan administration has only sped up Trident II development; it has not significantly sped up Trident I development. To some de-
gree, this has been an indirect result of the level of energy the administra-
tion has had to expend in order to protect funds for MX development and pro-
curement. Additionally, funds which might otherwise have been channelled
into Trident development are being directed to the rejuventated B1-B stra-
tegic bomber program, to additional funding for the MX missile, and to more
substantial increases in conventional arsenals.

The Trident System, American Strategic Doctrine and
Counterforce Targeting

The recent Reagan administration decision to accelerate the develop-
ment of the Trident II and the SSBNs to carry the larger missile, "though
expensive and probably premature," symbolizes a trend toward, and the codi-
fication of, an increased counterforce-targeting emphasis in American nuclear
strategy.

At present, the U.S. SLBM force, including the Trident I missiles, does
not have the requisite combination of warhead yield and accuracy for theo-
retical and hence, credible destructive potential against hardened military
targets. As a consequence of SBLM targeting limitations and the greater U.S.
reliance on submarine systems as strategic warhead platforms, U.S. land-
based forces, currently are theoretically more vulnerable to Soviet pre-
emptive attack than are Soviet land-based forces to a similar U.S. attack.

While a superficial analysis of static indices of the strategic balance
may label this situation a dire predicament, in reality this is not the case.
To posit that the members of the Politburo would even consider such a calcu-
lated attack, given the distinct possibility of an American retaliation of
thousands of SLBM and strategic bomber warheads, is to posit in a rather tenuous fashion. And yet "self-legerdemain" over supposed vulnerability can paradoxically result in a hampering of American resolve in crisis situations. As Robert Jervis recently explained in International Security,

... U.S. commentators are creating self-deterrence because the scenarios they are contemplating probably are mythical. The best example is a Soviet attack on Minuteman silos and other U.S. strategic forces. Although abstract American models may indicate that these forces are vulnerable, these calculations involve several simplifying assumptions--e.g., that the Soviets could fire a carefully coordinated salvo or hundreds of missiles, that the figures for accuracies derived from firings over test ranges would hold true when the missiles were fired over different parts of the earth with different gravitational anomalies, that all systems will work as expected... decision-makers should... also note the political questions which are begged. No decision-maker has ever taken an action which accepted uncertainties as portentous as those which would be involved in a first strike. Would the side that was behind in the counterforce exchange continue to spare the other's cities?... would the leader be able to retain the necessary control over their emotions and their forces? 31

Soviet strategic deployment programs are in the process of reaching maturity, while American programs are just in the process of receiving increasing momentum, after a decade of development which centered almost exclusively on qualitative improvements. This has contributed a good deal to the formation of American perceptions of strategic vulnerability.

When American strategic programs begin to approach maturity in the early 1990s, the Soviet Union will likely face a formidable array of new American strategic weapons (the MX, Trident II, Bl-B, ALCM, and SLCM) all with counterforce capabilities. 32 If the current American situation seems precarious, it appears to pale in comparison to the quandary the Soviets land-based forces
will face from these new American forces given the Soviet degree of reliance on land-based systems.

American strategic doctrine has already undergone change, in anticipation of the counterforce capabilities the Trident II missile and other new strategic weapons will possess. This should not be surprising given that strategic doctrine and national security policy are inextricably linked to the weapon systems that underlie their operationality.

However, an announced emphasis on counterforce targeting is not a new phenomenon in American strategic doctrine. American elites over the past twenty years have oscillated back and forth between announced counterforce or countervalue targeting strategies, the impetus of which has often been the climate of relations between the superpowers. For example, Robert McNamara, in 1962, declared the counterforce strategy as the governing operational procedure for the use of strategic nuclear weapons. By 1964, "this strategy had been quietly replaced by a strategy of retaliatory (second) strike against industrial and civilian population centers." By 1964, "this strategy had been quietly replaced by a strategy of retaliatory (second) strike against industrial and civilian population centers."

During his second term, President Nixon returned official strategic doctrine to counterforce which "culminated in the process of 'retargeting' of the U.S. strategic forces from civilian to military objectives on the Soviet Union (the "Schlesinger doctrine")... and yet three years later, Secretary of Defense Harold Brown, declaring the Carter Administration's adherence to the deterrence strategy stated that, "We recognize that our second-strike deterrent is to be stable as well as secure, the Soviet deterrent must be secure as well."

Presidential Directive (PD)-59, signed on July 12, 1980. President
Carter returned the U.S. to a counterforce strategy and was "reported as directing a major change in U.S. strategy." This declared change in strategy has been continued, if not strengthened, by the Reagan administration.

But have U.S. targeting strategies really changed continually as a result of this political maneuvering? Desmond Ball poses the appropriate questions, "To what extent have successive U.S. strategic nuclear war plans in fact emphasized the targeting of Soviet cities rather than military forces and installations? How familiar are officials in Washington with the details of targeting plans drawn up by the Joint Strategic Target Planning Staff...?" For the purposes of this discussion, Ball makes the useful distinction between American declaratory policy and force employment policy among other facets of U.S. strategic nuclear policy.

Declaratory policy is that policy "outlined in the secretary's Annual Report and in other official pronouncements...; it provides some official rationale for budgetary and other decisions, and the currency for most of the public debate about strategic policy, but it does not necessarily resemble at all closely how the United States would act in times of crisis or war." Force employment policy is that policy which "describes how the United States would actually use its strategic forces in the event of a nuclear exchange;" but,

The fact that senior Administration officials would still say in the 1970s that targeting plans should be revised to include options in addition to "indiscriminate mass destruction of enemy civilians," as President Nixon stated on February 25, 1971 is, however, a measure of the extent to which the realities of U.S. strategic force employment policy have generally not been appreciated.

Perhaps what is most ironic about his off and on "politicizing" of
American targeting plans is that the underlying "American nuclear war plans have always included a wide range of types of targets -- military forces, stockpiles, bases, and installations; economic and industrial centers; political and administrative centers; and, after 1950, the Soviet nuclear forces." For example, in the 1960s, a variety of government pundits stated that the U.S. retaliatory capacity was aimed at cities, "But the Pentagon continued to target silos." In fact, when Richard Garwin, a physicist, served on a White House advisory panel on targeting in 1968 with the "mutual assured destruction" doctrine at its acme, he discovered that "only 7 percent of the warheads were targeted against assured destruction targets [cities]." He also said there was no evidence of previous awareness at the White House or on the National Security Council that the Pentagon had continued to target primarily military facilities.

The response, under President Nixon, "was not to creat a new target list, but instead to develop a better rationale for the existing one." The result was the "flexible response" strategy which Nixon and Secretary of Defense James Schlesinger justified on the grounds that the Soviets, in time of crisis, would contemplate a limited nuclear attack on U.S. military forces. Hence, the maintenance of deterrence would be better served if the President had this flexibility in targeting a retaliatory strike.

This strategy remains with us to this day. It is once again being employed, this time by the Reagan Administration, in concert with the "vulnerability" of the U.S. Minuteman force, to justify another yet more intensive and expensive round in the strategic arms competition. This strategic buildup, with its none too subtle nuclear fighting overtones and consequent emphasis on counterforce capable nuclear weaponry, was initially justified...
by the Carter administration under the guise of a "new" strategic doctrine dubbed the 'countervailing strategy' by Secretary of Defense Harold Brown in a speech given at the Naval War College in August, 1980.48

The strategy has been continued, if not in word then in action, by the Reagan administration. Walter Slocombe, Deputy Undersecretary of Defense for Policy Planning during President Carter's administration explains that the countervailing strategy is governed by

. . . the proposition that deterrence over the full range of contingencies of concern requires in an age of strategic parity that the United States have forces, and plans for their use, such that the Soviet Union, . . . would recognize that no plausible outcome of aggression would represent victory. . . In sort, the policy [dictates]. . . that the United States must have countervailing strategic options such that at a variety of levels of exchange, aggression would either be defeated or would result in unacceptable costs . . .

. . . the fundamental U.S. objective is and remains deterrence -- but not just of massive attacks on U.S. cities. The United States needs to consider also how to make U.S. nuclear power contribute to deterrence of less than all-out attacks. . . 49

Unfortunately, the nuclear force structure presumed necessary to implement this capability, rusefully delineated in defensive terms, is the same nuclear force structure which panders to a first-strike capability. The perceptions received and the messages conveyed to Soviet leaders will be much more so derived from American capabilities rather than announced strategic weapons doctrine. As Henry Trofimenko has recently commented, "What are the guarantees for the opponent that the U.S. will show restraint, that the American strike will be only retaliatory rather than preventive? Upon what can the opposite side count?"50 But he concludes that,

The Pentagon strategists evidently realize that the Soviet Union evaluates the external threats to its
security in categories of objective material potentials and possibilities, not pronouncements of this or that statesmen. So from the viewpoint of safeguarding the interests of the USSR and protection of its population in case of aggressive use of American strategic forces, such declarations are irrelevant. 51

Why should the announced "renewal" of a counterforce emphasis in targeting be reason for worry if counterforce targeting has always been an integral and standard component of American nuclear war plans since the 1950s? First, the return to counterforce symbolizes the decline in U.S.-Soviet relations especially in the last four years with its resulting deleterious ramifications for arms control negotiations.

Second, it reveals how very far U.S. and Soviet negotiators will have to come to reach another meaningful arms control agreement, given the present administration's lackadaisical, if not blatantly disdainful, attitude toward the intrinsic value of arms control agreements in contributing to national security.

Third, it is being used as a justification, if not a mandate, for the procurement of a new group of extremely costly, sophisticated, and probably destabilizing strategic weapons perhaps most completely epitomized by the capabilities and cost of the Trident II system and the Reagan decision to accelerate the system's development.

As R. Jeffrey Smith contends in a recent article in Science, "Extensive conservatism and technological wizardry are behind the decision for a Trident II, and the strategic implications are unsettling."52 Furthermore, the Trident II program itself will cost over $15 billion, and its accuracy and potentially short flight time will make it arguably "the most destabilizing first-strike weapon ever built, far more [so] than the MX."53 as
Representative Thomas Downey (D.-N.Y.) has presciently asserted.

The most disturbing trend accompanying the "return" to counterforce is that qualitatively and quantitatively, the capabilities of nuclear weapon arsenals, in general appear to be gradually permitting the likelihood of a successful counterforce mission. Strategic weapon capabilities and strategic nuclear doctrine are approaching an unprecedented consistency and as a result, the possibility of a successful pre-emptive nuclear strike looms more forebodingly. Offensive nuclear weapon technology is continuously improving warhead accuracy and reliability, which allows for the use of a lower yield warhead (which in turn diminishes collateral damage should the warhead be used).

By making the use of nuclear weapons more believable through technological improvements and doctrinal shifts to counterforce targeting the threshold at which the weapons might actually be used is consequently lowered (e.g., witness the increasingly frequent discussions of limited nuclear warfare in American defense circles). That can be the the only outcome of a national security policy, which when adequately supported with weapons of the requisite capability, attempts to make their limited deployment more credible and theoretically legitimate in a conflict situation.

Hence, the real danger is that over time, given the current ineffectual nature of arms control agreements, "each reversal [between countervalue and counterforce strategy] is effected at a new and qualitatively more perfect level of arms on the part of both the United States and its "potential enemy."

As Henry Trofimenko further points out, "Therefore the counterforce of 1980 is not identical to McNamara's counterforce of 1960."
Similarly, the counterforce of 1990 will not be equivalent to the counterforce of 1980 as the arsenals and counterforce capabilities of both superpowers continue to grow. If present trends are not arrested, the possibility of a successful pre-emptive counterforce attack will be more ominous, and its attractiveness during a military confrontation may be too enticing to either side to restrain from dispensing with strategic deterrence.

Despite the fact that numerous uncertainties would still pervade any consideration of a pre-emptive nuclear strike even with a vast array of counterforce weapons, it is difficult to dispute the notion that counterforce capabilities make nuclear pre-emptive somewhat more luring. These capabilities, whether real or surmised, exacerbate an already tension-ridden international environment by encouraging the superpowers to 1) deploy larger nuclear arsenals in the hope of securing a sufficiently redundant and hence, more "credible" capacity; 2) use their nuclear weapons first during confrontation for fear of losing them if the adversary initiates a counterforce attack; and 3) rely more extensively on "launch on warning" and other techniques designed to enhance pre-launch survivability. What culminates is not only an increase in the probability of initiation of intentional nuclear conflict, but also an increase in the probability of a haphazard, accidental nuclear conflict occurring.

How will the complete deployment of the Trident I and Trident II missile system affect the Soviet strategic calculus? Will they add to or detract from the maintenance of strategic deterrence? Although it is somewhat difficult to guage how deterrence operates at any level, much less the strategic level, and what force levels and configurations enhance its viability,
it is plausible to postulate that deterrence rests paradoxically on a mixture of factors, some contributing to deterrence because of their characteristic "certainty", others contributing because of their characteristic "uncertainty".

The actual nuclear forces contribute to deterrence through the relative level of certainty they project with respect to such technical aspects of their composition as reliability, survivability, penetrability, and most importantly, the level of destruction they will surely wreak if they are unleashed in retaliation. Additionally, how the opposing forces balance against one another and whether a rough parity (which beyond a certain level of forces can include a wide range of seemingly "imbalances" in static force levels and yet still remain operable) exists appears to contribute to deterrence at the strategic level. Also, deterrence seems to be enhanced to the extent that each side has a theoretically survivable retaliatory capacity should the adversary initiate an attack.

The human element, inclusive of the entire range of human limitations with respect to perceptions, emotions, sensible decision-making, resolve, and so on, provides the chief source of uncertainty in the strategic deterrence calculus. Ironically, the uncertainty these factors introduce into the strategic equation often enhance the workings of deterrence by encouraging "self-deterrence" on the part of the government contemplating aggression through hesitant and conservative decision-making. And yet, the human element is crucially important in sustaining deterrence. As Desmond Bial has noted,

deterrence is in the end a matter of national will and resolve, not a function of residual military capabili-
ties. . . National will and resolve are functions of many factors; the most significant are the character of a nation's leadership, the cohesiveness and historical traditions of a society, the nature of the adversary; and a people's expectations and "perception of what is at stake." These factors cannot be quantified for inclusion in any of the standard models for assessing the strategic balance and the viability of deterrence, . . . 56

With the preceeding thoughts as a guiding dictum, the significance of the exact technical capabilities of the Trident I and Trident II system appears to diminish substantially with respect to their influence on deterrence. But capabilities do affect adversarial perceptions and thus, the selection of a weapons system can convey intentions thereby stabilizing or destabilizing the international arena.

The Trident I, while a generational improvement over the Poseidon-class, remains an inherently countervalue weapon system although it is "capable of attacking a range of Soviet [soft] military targets, such as airfields, submarines, ports, utilities, troop formations, armament plants, and some command links."57 However, it does not threaten hardened Soviet targets such as ICBM silos and C-3 links which would threaten the Soviet retaliatory capacity. It is, therefore, a weapon system that enhances strategic deterrence.

The deployment of the Trident II poses a more serious quagmire. For the first time, a nuclear weapon system will possess a very high degree of invulnerability with a similar degree of destructive power and accuracy. From a purely "military tactic" perspective the Trident II is the strategic weapon par excellence. But this combination of capabilities does not seem to enhance deterrence because it does not appear to preserve the second strike
nature of the SLBM.

Several options are open to the Soviets if arms control negotiations do not hold any promise. First, the Soviets might move to mobile ICBMs although there are several operation problems connected with such a basing mode. Second, the Soviets might consider deploying an extended antiballistic defense system, but this would require renegotiation or abrogation of the ABM Treaty and a reliable system is still not technically feasible. Third, the Soviets may begin to allocate more resources to hasten the Soviet development of SLBMs with similar capabilities.

Fourth, the Soviets might pursue a launch-on-warning strategy "which would be the least expensive from their point of view and clearly the most worrisome to the United States." As a Soviet official recently confided to Roger Wilkin, a senior fellow with the Joint Center for Political Studies in Washington, while he was visiting the Soviet Union, "The more you have in counterforce capabilities, the more there is a danger that the other side will build up and go to a launch-on-warning, with the computer element stepped up and the human element reduced. And of course, that's more dangerous."59

Whether the Soviet response is adverse and destabilizing will depend on how the Soviet leadership views the American modernization program. As admitted by the Reagan administration's arms control report, the response will depend on "whether the Soviets interpret our overall strategic program as representing primarily an escalation of the threat to their strategic forces or recognize the new program's clear emphasis [sic] on retaliatory capability." As R. Jeffrey Smith contends in Science, "It seems clear that the
Soviets have chosen the former, and the consequences -- as yet unannounced -- could be extremely dangerous."61

U.S. and Soviet Antisubmarine-Warfare Capabilities

The stability of strategic deterrence depends on the mutual viability and invulnerability of the superpower's sea-based nuclear forces. However, antisubmarine warfare (ASW) capabilities of the superpowers increasingly show signs of possibly encroaching on this invulnerability. Because of the enormous resources involved, "only the superpowers can contemplate the [strategic] ASW mission -- that is, the use of ASW systems to counter an opponents sea-based nuclear deterrent forces."62

A delineation of the force levels derived from the Military Balance 1980-81 reveals that: the United States had 41 SSBNs, 75 SSNs, and 6 diesel attack submarines for a total of 122; the Soviet Union had 71 SSBNs, 19 diesel ballistic missile submarines, 49 SSNs, 148 diesel attack submarines, 45 cruise-missile nuclear submarines (SSGNs), and 23 cruise-missile diesel submarines for a total of 355; Great Britain had 4 SSBNs, 11 SSNs, and 16 diesel attack submarines; and France had 5 SSBNs and 21 diesel attack submarines.63

Fortunately, "Neither superpower currently possesses a viable strategic ASW capability but, . . . this could become a major concern by the end of the 1980s."64 Technological developments already "on the horizon seem to presage changes that may destabilize the sea-based deterrent by the end of the decade."65 In addition, problems with diminishing the vulnerability of
of C3I systems, in order that a secure, retaliatory role of the SSBN forces can be maintained, will become more pressing as the counterforce targeting potential of both superpowers is augmented throughout the decade.

Moreover, these factors do play an enlarging role in the strategic balance because "these ... developments create greater problems for the Soviet Union ... given the more technologically advanced state of American SSBN and ASW capabilities." 66 Although both superpowers employ a variety of ASW platforms (air, surface, and sub-surface) the advantage lies squarely with the United States and NATO. For example, "In addition to the West's superiority in aircraft carriers along with its other surface vessels capable of ASW tasks, the American Los Angeles-class SSN is the most effective attack submarine in the world and a total of 44 such vessels are projected for the fleet." Similarly, "the most effective Soviet ASW platform is the SSN (49 in number) ... [and while] ... the USSR continues to deploy 148 diesel attack submarines ... these are not effective against SSBNs." 67

The effectiveness of the ASW mission is contingent upon an ability to destroy the entire fleet of the opposition, given the nuclear weapons capability of each and every SSBN. Hence, strategists should begin to worry when the number of SSNs deployed and tracking an adversary's SSBNs surpass the number of an adversary's deployed SSBNs. 68 The disparate deployment rates of the two fleets are a salient consideration here. The at sea deployment rate of the Soviet SSBN fleet averages only 11 percent and even during periods of crisis in the past this rate has not been increased. This compares unfavorably to an American deployment rate of
60 percent which is increased to nearly 100 percent during periods of crisis. Consequently, despite the fact that the Soviet fleet is larger, this is offset by the higher American operational rate. This situation renders the American ASW mission a less difficult task than the Soviet ASW mission.

However, the continued American qualitative advantage has nurtured a Pentagon affinity for selecting lower mixes of highly sophisticated SSNs and SSBNs rather than higher mixes of less sophisticated weapons. The Soviet forces, while less sophisticated and reliable, are more numerous. Should ASW capabilities of the superpowers improve to the point where the ASW mission is conceivable and should the Soviets increase their deployment rate, the smaller American might be subsequently less secure. The American SSBN fleet is also likely to shrink considerably during the 1990s as Trident procurement is expected to level off at 14 ships.

Nonetheless, the near future still appears more pessimistic from the Soviet perspective. As Robert Byers suggests, "There are a number of possible ASW countermeasures, such as the use of SSNs to accompany SSBNs or the operation of SSBNs in ASW-protected home waters [which will become increasingly feasible given the range augmentations to new generation American and Soviet SLBMs], but by themselves these countermeasures are not sufficient to ensure the continued invulnerability of the SSBN--particularly in the case of the Soviet Union."

Funding for ASW activities and development will continue to receive high priority, and if the next generation of SLBMs does indeed possess counterforce capabilities, this will provide additional impetus for a
greater reallocation of resources to the area. For example in FY 1980 alone, the United States committed $7 billion in funds to ASW activities, approximately 16 percent of the Navy budget. Furthermore, ASW research and development accounted for over 20 percent of the Navy's entire R & D budget. 72

Geographical factors also favor the United States and contribute to its strategic advantage in this area. While the Soviet Union has the world's largest coastline, its access to deep-sea basins is poor, and its few submarine ports are "poorly situated". U.S. submarine ports provide easy access to deep-sea basins and "the U.S. antisubmarine-warfare program is designed to exploit... the strategic location of U.S. allies astride key geographical "choke points". 73

Joel S. Wit agrees with Robert Byers that at least in the deep-oceans, "One conclusion... is clear: Whereas American missile-carrying submarines at sea are generally thought to be invulnerable to... preemptive attack, Russian sea-based forces do not enjoy the same degree of perceived invulnerability." 74 In fact, he further concludes that U.S. and Allied ASW capabilities are likely to cause a "particularly rapid" erosion of Russian invulnerability in the deep ocean basins during the 1980s. It seems likely that Soviet leaders have perceived the strategic implications of this situation, as revealed by the extended range of Delta boat SLBMs and the new Typhoon boat SLBMs. The extended range permits these boats to operate in relatively safe waters near the Soviet Union.

The significant American advantage in ASW technologies and the greater sophistication of American SSBNs help to belie the Reagan administration's increasingly frequent rhetoric about the superiority of the Soviet strate-
tegic forces. This advantage may even widen by the time the complete Los Angeles-class SSN and Trident SSBN fleets have been deployed. Particularly, the Tridents, and the submarines retrofitted with Trident missiles, will have operational patrol area capabilities ten times as great as those of the Poseidon-class fleet. Moreover, although the Trident submarines are larger vessels, "they are . . . quieter and faster, can dive more deeply, and have more advanced equipment for electronic countermeasures, should a chance of Soviet detection occur."75 Too often assessments of the strategic balance emphasized static offensive force levels to the exclusion of qualitative trends in weapon technologies. It is argued that qualitative factors do not "project" political power as do actual arsenals of weapons but too often assessments of the strategic balance are designed for purely political reasons.

The crux of this situation is that "the U.S.S.R. does not have a similar capability and is not likely to develop one seen."76 Hence, as U.S. counterforce weapons are deployed in the later 1980s, U.S. ASW capabilities will contribute to Soviet perceptions of a impending American first-strike capability and "it seems likely the U.S.S.R. will face a perceived ICBM vulnerability problem that is much more vexing than the problem now said to be facing the U.S."77

Unrestrained improvements in the ASW capabilities of the U.S. will, moreover, influence arms control negotiations and the Soviet force configuration. A major U.S. objective in past arms control discussions has been to construct agreements which encourage the reliance of the superpowers on highly secure retaliatory forces, (i.e. submarine forces) and to discourage
the deployment of land-based forces which threaten those forces. Consequently, the SALT I agreement sought to limit land-based systems while allowing a mix of systems, but only in one direction—to sea-based systems. The SALT II accord placed stringent limitations on MIRVed ICBMs and the development of new ICBMs, while leaving sea-based systems relatively free of constraints with a freedom to mix sea-based missile totals upward, if desirable.78

Understandably, the Soviets have been reluctant to alter their strategic force configurations, given internal political constraints imposed by the Strategic Rocket Forces and the relative inferiority of Soviet technology with respect to sea-based systems. Although, Soviet sea-based capabilities have increased rapidly, the SALT agreements have not produced a significant redistribution of Soviet strategic forces toward sea-based systems. The American superiority in ASW capabilities has almost certainly reinforced Soviet aversions to relying more extensively on sea-based systems. It is doubtful that future arms control negotiations will be any more successful in accomplishing this goal if America's ASW capabilities do not grant the Soviets sufficient confidence in the survivability and reliability of their strategic submarine force.79 The current momentum of the American program makes this increasingly implausible.

Lest we all lose heart over the dilemmas posed by these developments, the problems although numerous and complex, are not insurmountable if purposeful arms control negotiations are pursued. Several avenues which might be feasible politically for the superpowers and which would enhance the sea-based deterrent are: numerical restrictions on SSNs and SBBNs; re-
restrictions on the development of new SLBMs, in order that their counter-value characteristics will not be upgraded; anti-satellite restrictions to enhance confidence in C_3I systems; and SSBN sanctuaries or 'ASW-free' zones.

C_3I Systems and Submarine Forces

The reliability and effectiveness of the sea-based deterrent is, in part, a direct function of the dependability of the command, control, communications, and intelligence (C_3I) links which connect American and Soviet SSBNs to their respective political and military centers. If the retaliatory role of the sea-based deterrents is to be credible, C_3I systems must at least be theoretically capable of riding out a first-strike attack while remaining intact. "Although the C_3I systems of both superpowers have a considerable degree of redundancy. . . , C_3I has been called the 'Achilles' heel' of the SSBN," As Desmond Ball elaborates, "The principal reasons are, first, the clear trade-off between the survivability of the submarines and the ability of authoritative command channels to exercise precise, centralized control over them; and, second, the inherent vulnerability of communications systems themselves." 82

At present, submarine system C_3I is conducted through a diverse array of land-based transmitting towers, surface ships, space satellites, and airborne systems which cover a frequency range from extra-low frequency (ELF) to ultra-high frequency (UHF). A wide range of C_3I platforms are necessary such that redundancy is assured, and the deficiencies of certain platforms are compensated for by the strengths of other platforms. For example, ELF
transmissions from land-based stations provide the most reliable ELF means of communication to submarines and, "Only ELF transmissions allow the SSBN to dispense with the use of an antenna or a trailing buoy,"\textsuperscript{83} -- obviously tactically beneficial. However, ELF transmitting towers are highly vulnerable to a first-strike attack.

The vulnerability of land-based towers is offset by the airborne systems, constantly on patrol over the oceans, which form the most survivable vehicle of the Soviet and American C\textsubscript{3}I systems.\textsuperscript{84} But should an attack occur, it could take the planes "hours to get within transmitting range, ... and they are vulnerable to the effects of an electromagnetic pulse (EMP) from atmospheric nuclear blasts over the oceans."\textsuperscript{85}

As with ASW capabilities, Soviet C\textsubscript{3}I systems are estimated to be less sophisticated and survivable than American C\textsubscript{3}I systems.\textsuperscript{86} Ideally, it would be advantageous if each superpower refrained from targeting SSBN C\textsubscript{3}I links (if some type of verification were also possible). Yet, this is not politically feasible, and some of the C\textsubscript{3}I links that work to ensure the credibility of the sea-based deterrents, also work to ensure the operatinality and potential lethality of the ICBMs with counterforce capabili- ties.

Enhanced credibility of C\textsubscript{3}I links can only help to stabilize strategic deterrence (assuming that SLBMs do not take on a counterforce potential). The most promising course of action seems threefold: increased redundancy in the superpowers' C\textsubscript{3}I systems, thereby decreasing the theoretical possibility of a C\textsubscript{3}I disabling attack; increased research and development to provide continuous incremental improvements in C\textsubscript{3}I system platforms; and the pursuit of
confidence-building measures over C_{3}I systems, in context of arms control negotiations (e.g., a prohibition of laser anti-satellite weapons development).
BRITISH NUCLEAR MODERNIZATION AND THE TRIDENT SYSTEM

As a medium-sized nuclear power, Great Britain faces national security problems fundamentally different from those experienced by the United States vis-a-vis the Soviet Union. While strategic deterrence rests on rough parity and the underlying operational concepts of "mutual assured destruction" and "flexible response", deterrence of hostilities in the European theater relies on a more complex set of factors. Theater nuclear deterrence involves two additional, independent "decision-making centers", the tattered yet still viable American strategic nuclear "umbrella," a Soviet preponderance in theater-range ballistic missiles, a NATO edge in tactical nuclear weapons, a conventional force configuration which visibly favors the Soviet Union, and a rough, yet escalating balance at the strategic nuclear level.

For obvious economic reasons, Great Britain cannot procure the quantity of nuclear weapons and delivery systems requisite to the conferral of superpower status in the international arena. Its security situation obliges Great Britain to accept a deterrence strategy based on countervalue targeting and minimum deterrence, and to rely on NATO and the American strategic nuclear guarantee.

Internal economic constraints, the technological sophistication of superpower nuclear weapon systems, and the lack of collaboration in Western Europe over the pooling of resources to develop "competitively credible" nuclear systems all work to limit the flexibility of British nuclear procurement plans.
Like the United States, Great Britain is undergoing modernization of nuclear forces. While the British modernization plans are not as strategically unsettling as those planned by the U.S. defense establishment, they do represent a formidable strengthening of nuclear capabilities and could very well embitter relations with the Soviet-bloc. Does the proposed British modernization of nuclear forces enhance deterrence in the European theater? What considerations were chiefly operative in the decision-making process that culminated in a proposal to purchase the Trident II missile system? What are the corresponding opportunity costs? These questions deserve attention if we are to discern the potential benefits and costs of the British decision and whether it is the optimal path to pursue.

British Security Policy and the Nuclear Deterrent

Economic necessity, more so than purposeful design, has provided the chief impetus behind the structural changes in British security interests since World War II. British military commitments steadily receded during the 1960s and 1970s as decolonization contracted the British Empire. Active British influence in its defenses and security interest is now generally restricted to the European land-mass, Great Britain itself, and the scattered colonial remnants, such as the Falkland Islands, of a once enormous expanse.

Great Britain has become what might be loosely called a 'medium power', not a really analytically distinct description, but one which merely connotes a plane of military capabilities directly below that of the superpowers. British national security policy, however, still wears, to a certain degree,
the accoutrements of a global power despite the fact that it is only "the residue of a world power which continues to display many of the attitudes and assumptions normally attributable to a major military power without the capability that such a status implies." These trappings are perpetuated by the British maintenance of an independent nuclear force.

British national security policy becomes operational through two avenues--a conventional and theater nuclear force role in NATO, and its modest, independent nuclear force. This posture -- a combination of defense and deterrence strategies -- is viewed as the most effective means of protecting British interests, given the economic and political variables constraining policy flexibility.

Exactly who the British deterrent is designated to deter is explicitly stated in British defense documents. The 1980 Defense White Paper plainly asserts that "the gravest potential threat is posed by the military forces of the Soviet Union and the other Warsaw Pact states." The most precarious development of late has been the significant enlargement of Soviet theater nuclear capabilities through the deployment of the SS-20 IRBM and the Backfire bomber. This has prompted Great Britain to avidly support the NATO deployment of new long-range theater nuclear forces, consisting of the Pershing II and ground-launched cruise missile (GLCM), and to permit the emplacement of approximately one-fourth of the GLCMs on British soil.

The specter of growing Soviet capabilities targeted at Western Europe during a period of mutually acknowledged rough parity between the superpowers has instilled "doubts about the unequivocal commitment of the United States to guarantee Europe. . ." These perceptions have reinforced British
desires to remain in the nuclear club and to continue to give the nuclear component of the British force structure high priority.

The nuclear bias has persisted relatively unaltered since its inception by Churchill in the 1950s. The acquisition and maintenance of an independent nuclear force was largely justified on three grounds: the weapons would preserve Britain's international prestige and great-power status enabling it to more effectively influence the United States; they would make a significant contribution to deterring the Soviet Union; and they would provide the opportunity for independent nuclear retaliation should the need arise. Exactly what conditions would create such a need were never explicitly espoused.91

Finding a reliable and survivable delivery vehicle proved to be a difficult task given the "pressure from both the Royal Navy and RAF to keep the deterrent in the hands of the airmen,"92 as vulnerable as these systems were. But the problem was overcome when the United States offered Britain the Polaris submarine system, excluding the warheads, in 1962 at a reasonable cost. The total procurement cost of the system including the "Chevaline" warhead improvements in the 1970s will come to 2.7 billion (1980) index), almost half of the cost of the new Trident system. The force of four Polaris SSBNs has been Britain's nuclear deterrent since the late 1960s and will continue until it is replaced by the Trident system in the early 1990s.93

The Selection of the Trident System

While the Labor Administration mulled over its reservations about re-
placing the Polaris system, the program to lengthen the operational life and credible effectiveness of the Polaris missile was begun in 1973. Deemed "Chevaline," the program was a specific response to British perceptions that Soviet improvements in ABM defenses around Moscow, permitted under SALT I, were beginning to erode the penetrability of the Polaris missile. Heavy Soviet investment in ABM research promised to bring about continuous incremental improvements in the Galosh system capabilities. For example, British sources have claimed that a new Soviet missile "can 'loiter' in the face of an ICBM attack [or for that matter, an SLBM attack], in effect slowing down and pre-starting its maneuverable warhead stage near the apogee of the trajectory while actual enemy warheads are discriminated from decoys." 

But why is it necessary to have the assured capability of devastating Moscow in a retaliatory attack, if numerous other unprotected and counter-value targets can be credibly threatened? The underlying assumption of the British strategy is that for minimum deterrence to be theoretically operative, Great Britain must be able to impose unacceptable costs on the Soviet Union compared to the potential gains should the Soviets launch a preemptive attack. The targeting of counter-value positions -- cities and industry -- is presumed to bestow the ability to inflict this unacceptable damage. As Moscow is the economic and political hub of the Soviet Union, the capability to reliably strike Moscow is believed to carry with it the greatest assurance that minimum deterrence will be maintained. As Robert Hutchinson has pointed out in International Defense Review, "successive UK governments could not allow their choice of Polaris missile targets to be narrowed down by the ex-
clusion of the zone protected by the ABM system -- a sanctuary stretching for hundreds of miles around the Soviet capital. This, . . . , did not mean that Moscow [sic] was necessarily a British target; neither did it mean it was the sole target.  

The improvements made under the Chevaline program allow the payload of the missile to change its course, angle of re-entry, and speed of descent. Although Chevaline does not provide a MIRV capability the program does provide for the early separation of warheads (a more accurate MRV capability), the inclusion of decoys, and the hardening of the re-entry vehicles to protect them from antiballistic missile attack.

With the election of the Conservative Government in May 1979, the question was no longer whether or not a replacement should be acquired, but rather what system would be most appropriate. Numerous options were available. Politically, three routes could be pursued: a direct purchase from the United States; co-development of a system within Europe; or the development of the system by Britain alone. A multitude of launch platforms were also considered.

On July 15, 1980, the Secretary of State for Defense announced to the British Parliament that the Polaris system would be replaced with the nuclear-powered Trident I missile system. Great Britain would purchase four submarines at an estimated cost of 5 billion, with an option for a fifth boat which would add another 600 million if funding permitted. The expenditures would be spread over the years 1980 to 1995 with more than half likely to fall in the 1980s. The program's procurement costs would not absorb more than three percent of the total British defense budget during
this period and equipment costs would remain below five percent of that component of the budget. 100

Approximately 70 percent of the initial outlays would be spent in Great Britain, with the actual construction of the boats making up the largest part of the domestic expenditures. The warheads, as with the Polaris system, would be assembled in Great Britain by the Atomic Weapons Research Establishment. Approximately 100 Trident I missiles would be purchased from the United States involving an expenditure of 1.5 billion. 101

The Government decision was accompanied by a document explaining the rationale behind the selection of the Trident system. Many military considerations were involved in deciding which launch platform and delivery vehicle would have the greatest degree of survivability and reliability. Concerning launch platforms, problems with ensuring invulnerability from a preemptive attack ruled out any type of ground-based force or air-launched force (although it is not apparent if mobile ground-based forces were seriously considered). Surface ships were ruled out because they are easier to track than submarines and they are not much cheaper. Similarly, diesel submarines are more vulnerable than nuclear-powered submarines because they would have to surface to recharge their batteries. Finally, a 'mini-sub' option was considered but this would have required extensive development by the British alone. 102

A variety of delivery vehicles was also evaluated. Ballistic missile forces were preferred over cruise missiles because they are much less expensive "for a given weight of strike power and a given probability of delivering it successfully," 103 in the face of upgraded Soviet air defenses. Deploying existing Chevaline missiles in new boats (the actual missiles do not age to the degree of the outer shells of the submarines) or developing
a new version of the Polaris A3 were rejected on the basis of cost and reliability. 104

Additionally, the U.S. Poseidon and U.S. Trident II systems were evaluated. The Poseidon system would not significantly increase the patrol area of the British submarine force (which would have growing implications given the gains to be achieved by the Soviets in ASW capabilities) and the number of warheads would be reduced. The purchase of the Trident II would depend on a U.S. Government decision to be made in two or more years -- an unacceptable contingency to the British government. 105

Lastly, some consideration was given to the possibility of the development of a collaborative program from the joint efforts of France and Great Britain. This, too, was rejected because of the economic costs involved and the political constraints imposed on Great Britain, as far as sharing nuclear information which had been transferred because of the "Anglo-American special relationship." 106

As is readily evident, cost, reliability, and invulnerability were the chief criteria used during the decision-making process. Implicit in this process was the underlying fact that commonality with the United States would decrease total costs while maximizing the reliability of the British nuclear deterrent. After all, "Trident was . . . chosen, . . . because it was the most modern, proven American system available. " 107

From a military perspective, and given the expressed political and security goal of maintaining a viable and independent nuclear force, the selection of the Trident system seems a prudent course of action. In all probability, the Trident system will remain a highly invulnerable, reliable,
and credible system for at least two decades after its deployment in the early 1990s. But when other factors are taken into consideration, such as the detrimental effects that Trident's costs will likely have on conventional equipment procurement and Britain's NATO commitments, Trident is at best a mixed blessing for British security policy.

Furthermore, financial commonality considerations have pushed Britain into acquiring the D5 version of the Trident missile, a missile with capabilities far in excess of those required for minimum deterrence. Ministry of Defense testimony before the House of Commons committee examining the Trident decision in 1981, revealed that choosing the D5 missile would result in substantial cost escalations in ship design (longer launch tubes and a larger hull) and in missile expense, and the allocations expended for long-lead items for the C4 missile would be lost. Although initial outlays would rise if the D5 missile were chosen, if it were not

... as the C4 was being phased in in the United Kingdom, it would already be on its way out in the United States (the boats at present fitted with the C4 will leave service by 1997), with the loss of all the advantages of commonality and the sharing of support costs. If the [British] SSBN were not built to take extended tubes, then any mid-term improvement to a Trident I force almost certainly would have to be undertaken by the United Kingdom alone. The Chevaline project, shows how expensive such a venture can be. 108

The cost of the Trident system has indeed jumped. Four boats equipped with the D5 missile will now cost at least £7.5 billion. The increase of 50 percent is due to "a £600 million increment for the improved submarines, £390 million for the D5 missiles, £710 million for exchange rate adjustments and £800 million for inflation." 109

The D5 missile does exceed Britain's deterrence requirements. As a
consequence the government has attempted to downplay the hard-target ca-

pabilities and other destabilizing characteristics of the D5 missile. U.K.

Secretary of State for Defence John Nott went so far as to state that,

"The government wishes to make it absolutely clear that the increased ac-
curacy of the Trident D5 system played no part in its decision to adopt the
more modern system." 110 Further commenting on the first-strike capabili-
ties that the deployment of four Trident II submarines might confer to the
British, Secretary Nott posited that,

Even if a United Kingdom government had any thoughts of a first-strike capability, simple arithmetic demon-
strates that it is totally beyond its grasp. The fire-
power of the British force with maximum D5 payloads would
be sufficient to target only a small proportion of the
Soviet ICBM silos. Trident C4 would be sufficient for
our deterrent needs. The reasons for choosing the D5
hinge on the retention of commonality with the United
States navy. 111

As if to demonstrate its own skepticism of Secretary Nott's argument,
the government announced that the warhead capacity of the Trident II sub-
marines would not exceed the level that had been planned for the Trident I
submarines. Whereas the C4 missile was designated to carry eight MIRVed war-
heads of 100 kt each, the D5 was designed to carry 16 MIRVed warheads but
will obviously carry fewer warheads if every launch tube is used in the four
SSBNs. 112 The "maximum D5 payloads" Secretary Nott spoke of would contain
1024 highly accurate warheads, a number quite menacing to the Soviet Union.

The Opportunity Costs of the Trident Program

There can be no doubt that the Trident II system will revive the
British nuclear deterrent, but British security policy is also strongly
founded on providing Britain with conventional defenses and to making a significant contribution to the defense structure of NATO. It is all too clear that planned allocations for the Trident system will have harmful repercussions on other British procurement plans, budgeted to sustain these other commitments of strategic magnitude. Selection of the Trident II will in the short run complicate these matters. So Lawrence Freedman has contended, "the real problem for Trident is not so much its absolute cost but the fact that a place has to be found for it in an extremely tight defense budget," and, "Trident is arriving on the scene as an extra change at a time when the mismatch between aspirations and resources in British defense planning has once again proved to be "impossible to ignore."\(^{113}\)

The benefits of Trident, therefore, must also be weighed against the opportunity costs of the program -- the sacrifices which will have to be made with regard to weapon requisitions, and the contributions these other weapons would make to Britain's defense posture.

Upon initially requesting the purchase of the Trident I program, Prime Minister Thatcher assured President Carter that Britain was resolutely committed to the Long-Term Defense Program of NATO which consisted of 1) the modernization of the long-range theater nuclear forces, a portion of which would be sited in Britain; and 2) annual real increases of three percent in defense until 1991, in order that conventional capabilities would be strengthened. The resources that the commonality with the United States would release would allow Britain "to reinforce its efforts to upgrade its conventional forces."\(^ {114}\)

It is likely, however, that this pledge will be gradually brushed aside, out of fiscal necessity. Moreover, "the Trident deal will probably hasten
the time when Britain has to discard one of its major conventional roles in NATO."\[^{115}\] The beginning of peak expenditure on Trident (the late 1980s) will correspond, unfortunately, to the move to annual real increases of one percent in the defense budget in 1986, which will "intensify the problems faced in accommodating all current programs in the long-term costings when the time comes for them to be included in the actual defense estimate."\[^{116}\]

There is evidence that this is already occurring. The target of three percent was neither met in 1980-1981 nor in 1981-1982 and a new target of 2.5 percent has already been established. Some officials speculate that real growth in the defence budget may be as little as 1.5 in 1982-1983.\[^{117}\] The budget of 1980-1981 and 1981-1982 did not even contain substantial funding for the Trident system -- less than £100 million altogether.\[^{118}\] And further, "if past patterns hold defense spending will actually decline by 1.5 percent annually over the next decade, bringing it down to 4.4 percent of GDP by 1990."\[^{119}\]

Budgetary realities will undoubtedly force the cancellation of numerous conventional weapon programs and, in fact, this has already begun in anticipation of the diversion of funds to the Trident program. While the initial government position claimed that Trident would not likely absorb more than five percent of the equipment budget in any one year between 1980 and 1995, military officials in the Ministry of Defence and the Royal Navy confirmed in 1981 (even before the more expensive Trident II was selected) that "during the three-to-four-year peak spending period after 1986, the new strategic nuclear deterrent could eat up about 12 percent of the new-equipment component of the U.K. defense budget. . ."\[^{120}\]
According to Admiral Sir Raymond Lygo, chairman and chief executive of British Aerospace Dynamics, speaking before the parliamentary defense committee in 1981, several programs had already been cut since early 1980. The cuts included "an extensive redesign of "Sea Dart," the Alarm defense-suppression weapon and, . . . [the] Sky Flash Mk2." Additionally, "The production rate of Sea Skua and Sea Wolf has been cut and there is apparently to be no mid-life improvement program for Sea Skua." Sir Raymond also expressed concern over the future of the Sea Eagle air-launched anti-ship missile.

A review of future defense plans by the Ministry of Defense in early 1981 led to draconian budget cuts in the Royal Navy while the Trident program remained unscathed. But while these initial budget cuts have generally detracted from the conventional forces solely designated for the defense of Great Britain itself, British commitments to the NATO defense posture will also be affected in capabilities, if not in announced policy. The more grievous adjustments to the British contribution to NATO required by Trident expenditures will take on a "structural" or "scalar" form. It is likely, for political expediency, that they will be scalar in nature, resulting in a relatively even diminishing of resource allocations across all NATO commitments, while in name the commitments are sustained, rather than a structural change "substantially affecting (and perhaps eliminating) one of Britain's three major areas of conventional contribution to NATO . . ." To completely eliminate or even significantly downgrade the extent of the British sea-based contribution (FASTLANT), the ground-based combat forces of the Central Front (BAOR), or Royal Air Force Germany are actions that would
carry political costs too expensive to pay. 

Ironically, it is possible that Trident development will even upset the previously planned deployment schedule of the weapon system most capable of protecting the Trident submarines from Soviet ASW capabilities -- namely, the nuclear attack submarine (SSN). The House of Commons committee which from June of 1980 to early 1981 investigated the Trident purchase concluded that "Trident's most direct impact will be on the construction of nuclear attack submarines." Only two ship construction yards in Britain, Vickers and Cammell Laird, are capable of constructing SSNs and Trident construction is already scheduled for the Vickers yard. The committee was told that although it would be desirable to maintain the present SSN construction rate of one every 15 to 16 months, Vickers could not build the SSBNs and SSNs simultaneously. If Cammell Laird is not made available through refurbishment for SSN construction, SSBN construction will displace SSN construction on a one-to-one basis for a seven year period. Whether or not the money would or even could be made available for refurbishing Cammell Laird and exactly what level of expenditures would be necessary was not made lucid by the Ministry of Defence. The Navy's Director, Project Team (Submarines) did, however, tell the committee that "it would be uneconomical, with the level of programs we have, to try and run the two yards." As the committee concluded, given the continuous advances being made by the Soviets in ASW capabilities, curtailing SSN construction was a disturbing prospect.

Lastly, shortfalls in equipment procurements do not comprise the entirety of the opportunity costs of the Trident program although they are
most salient and visible. The failure to upgrade conventional forces and budgetary cuts, especially in the Royal Navy, have worsened service morale.\textsuperscript{127} The "nuclear versus conventional arms" competition for funds, moreover, has polarized the defense community, but not over whether a strategic deterrent should be maintained, but in selecting Trident II as the weapon system to accomplish the goal. The inevitable result of these "defections from the defense establishment" has been a lessening of support for Trident in defense circles and from the public.\textsuperscript{128}

Public opinion polls taken in September and November of 1980 and April of 1981 evince that support for Trident dwindled from 44 to 32 percent, while opposition to Trident climbed from 47 to 53 percent. Lawrence Freedman concludes that there has been, "a continuing decline in support for Trident that most likely reflects the fact that it has so few vocal supporters outside the Government, or even in the military."\textsuperscript{129} As the implications of the Trident system become less obscure and more pronounced, public opposition to Trident, which has become more markedly noticeable in the last year, may necessitate a stronger enunciated rationale from the Government as well as more vocal support from prominent government officials.

The Rationale Behind the Maintenance of the British Deterrent

Despite the fact that British decision-makers have already opted for an independent nuclear deterrent, it is useful to ponder whether the original justifications for the system still hold and whether the current rationale is logically consistent with other tenets of British security policy.

As mentioned earlier, the original justification centered on maintaining
Britain's international prestige and influence with the United States, contributing to Western deterrence, and providing Britain with the option of independent retaliation. Any such assessment involves, of course, many imponderables, but it is useful nonetheless.

Perhaps the most "curious domestic and external political feature of the British nuclear force is that the incentives [since the introduction of the Polaris system] have been for the Government to play down both its strategic and diplomatic significance." The modest initial and operating costs of the Polaris system enabled the Government to carry on in this fashion until serious discussion over a successor for Polaris began in the mid-1970s.

The downplaying of the independent deterrent since its introduction seems to belie the contention that the nuclear force was envisaged as aiding in the upkeep of Britain's international prestige and influence with the United States, since it has seldom really been evoked in such a manner. It may have been envisaged as such, given that when Polaris was purchased its destructive potential represented a greater relative potency vis-à-vis the superpowers than it does today, but in any case the feasibility of this argument diminished continuously throughout the 1960s and 1970s as the superpowers deployed much larger quantities of nuclear weapons. By 1980, the total number of British warheads represented only two percent of the U.S. and USSR totals. Unlike the French, it does not appear that this justification has been all that important to successive British governments. As Bruce George and Karl Pierangostini argue, "The British experience seems to support the view that while possession of these weapons may be a neces-
cessary condition for great-power status, it is by no means a sufficient condition, as Britain has combined the possession of strategic nuclear weapons with a decline in its international status.\textsuperscript{133}

The other two justifications can be dealt with together as the last is really a particular aspect of the second. Although debate over how the British deterrent fits into the strategic calculus of NATO and Great Britain itself has in the past been circumscribed by domestic politics and diplomacy, these considerations are the most germane to an analysis assessing the necessity, or lack thereof, of an independent nuclear force.

The difficulty has been in resolving the British deterrent with the American nuclear guarantee in context of NATO. Early on, British elites justified an independent deterrent because the U.S. did not have sufficient bombs to cover all important targets, and later, because Britain had to ensure that targets of low priority to the U.S. (i.e. medium-range forces) but high priority to Britain were indeed targeted. The soundness of these arguments, however, was nullified by increased U.S. nuclear weapon construction in the 1950s and 1960s and by the stationing of U.S. theater nuclear forces in Western Europe.\textsuperscript{134}

From the mid-1960s the justification has evolved into a two-pronged argument which has remained relatively consistent given the wide doctrinal swings U.S. security policy has undergone. Officially, the British deterrent contributes to the NATO deterrence posture and also represents an independent nuclear decision center to further bemuse the adversary. The contribution to NATO deterrence results from the British capability to employ their nuclear forces in a coordinated retaliatory attack by the
Alliance. The reality of multiple nuclear decision centers further deters the adversary, a notion made compatible with the American nuclear umbrella through the following ratiocination:

the British Government has complete confidence in the U.S. guarantee but recognizes that, mistakenly, the adversary may be less impressed. A second center of nuclear decision, particularly one close to the likely conflict, would add extra uncertainty to the adversary's calculations. The risk of calling the American bluff might be tolerable, but not necessarily that of calling the British and French bluffs as well. 135

On the surface this reasoning may please the "mental" palate, but it carries the baggage of several inherent contradictions. Increasing uncertainty in the Soviet contemplation of attack seems to be the linch-pin. With the relative paucity of the British force in theater nuclear capabilities, British restraints or collaboration in a NATO retaliatory strike involving U.S. strategic weapons would likely be negligible to the Soviets. 136 Hence, the magnitude of the British forces is not as crucial as is increasing the number of factors (and therefore the uncertainty or margin of error) which the Soviets would have to consider if they were contemplating a limited conventional attack of Western Europe. Despite official announcements to the contrary, the second decision-making center permits the possibility of Britain initiating the use of nuclear weapons against American wishes or the opposite, remaining a sanctuary if a conflict between NATO and the Warsaw Pact had escalated to the nuclear level. 137 Moreover, the British minimum deterrence posture seems to fly directly into the fact of the American nuclear guarantee, exposing British concerns over a possible "decoupling" should an American President decide against strategic retaliation in the event of
Soviet aggression, or should the United States diminish its commitment to Western Europe in the future.

The inevitable consequences of these contradictions is an inconsistent security policy which "casts doubts on Alliance solidarity and the quality of its decision-making, and makes the assumption that an increase in uncertainty is always desirable." It is simply presumed that more uncertainty will foster a greater degree of caution, but this may or may not be so in a crisis situation.

One might suppose that these pervasive contradictions and inconsistencies would unnerve American political elites and strategists but this has not been the case for some time. Although limited nuclear capabilities were repudiated with contempt in the early 1960s by U.S. defense planners such as Robert McNamara, acceptance of the forces grew gradually, and the U.S. position has moved to one favoring their retention.

What this leads to is the conclusion that the British deterrent is really not credible without the American nuclear guarantee given the first strike capabilities of the Soviet nuclear forces. Soviet commentary has alluded to this noting that "any exchange between Britain and the USSR would mean less than total destruction of the Soviet Union, but complete devastation of Britain." Without the U.S. pledge, British use of their nuclear forces would indeed be suicidal.

One must really question then whether minimum deterrence, standing alone, is a workable concept in the British context. It appears that the security of Britain is tied to NATO and the American nuclear guarantee irrespective
of the British nuclear forces. And yet, Great Britain plans to deploy a replacement for Polaris which will greatly increase the potential destructive powers of the British deterrent. Four Trident boats will provide a 166 percent in number of warheads and a 23 increase in gross megatonnage. Such an acquisition will do little to mollify the tense state of affairs between the East and West.

The acquisition of Trident could also spell trouble for future arms control negotiations between the superpowers. In the past, the U.S. has held steadfast on refusing to allow British and French nuclear capabilities to be counted in the aggregate totals. It is doubtful that the Soviets will continue to remain tractable to this U.S. position given the counterforce potential of the Trident II system. In all likelihood, the Soviets will be increasingly exigent in calling for allowances in their own force configuration to offset new British and French systems, especially the British Trident II system.

The British experience epitomizes trends in nuclear weapons acquisition that are also found with increasing frequency in the United States and France. Larger arsenals of more sophisticated nuclear weapons are increasingly justified on the perceptions to be conveyed and what the other side possesses or is "estimated" to possess, rather than on objective force requirements based on defense and deterrence needs. It seems apparent that advances in weapons technology are sought without abatement or doctrinal design, and that strategic doctrine is continually "reinvented" to encapsulate the improved capabilities, rather than the reverse. The British experience, in particular, demonstrates the effect that the imponderable nature of the
"true" functioning of deterrence can have on concerted efforts to sustain deterrence. Lacking knowledge of how deterrence actually operates fosters excessive conservatism in the acquisition of nuclear weapons, and a tension-ridden international environment only reinforces this proclivity. As Lawrence Freedman contends, "The general confusion over what makes deterrence 'work' discourages dismissal of something that might possibly be acting as a constraint on the Kremlin."144

In the end, what we perceive our adversary to be perceiving is, despite the inaccuracies involved, given inordinate weight in the decision-making processes of weapon systems acquisitions. The "better to be safe than sorry" principle begins to operate with little reflection about what capabilities constitute an adequate defense and deterrence posture. This tendency was subtly revealed in a statement by preceding UK Defense Secretary, Francy Pym in support of the Trident system:

> Until genuine wide-reaching multi-lateral arms control can be negotiated, any diminution in the pattern and structure of our wholly defensive capability must increase rather than reduce the risk of war, especially at a time when the Soviet Union is rapidly building up its massive military strength. 145

If the British have any confidence whatsoever in the American nuclear guarantee and in the continued viability of NATO, then the acquisition of the Trident II system appears to contribute little to the defense of Britain, is of dubious strategic value and consumes resources which could be put to better use strengthening Britain's commitment to NATO and British conventional forces. The questions are what actually deters, what posture constitutes adequacy, and what posture constitutes excessiveness? A separate nuclear deterrent seems beneficial to Britain, but the opportunity costs of Trident significantly subtract from the deterrent's value.
MODERNIZATION OF THE FRENCH SEA-BASED NUCLEAR FORCES

Like the sea-based nuclear forces of Great Britain and the United States, the French sea-based nuclear forces are undergoing expansion and modernization. The problems facing France to some degree resemble the problems facing Great Britain. Obviously, this is due to France's status as a medium nuclear power and the level of resources available for defense spending that this status implies. The similarity to the British situation really terminates at that juncture. Neither France nor Great Britain can compete with the superpowers in the procurement of nuclear weapon systems. In order to justify the existence of their independent nuclear deterrents, the medium nuclear powers must resort to arguments based on the tenets of proportional deterrence and proportionality. Theoretically, the inferior power sustains deterrence by insuring that the perceived costs of the aggression clearly exceed its perceived benefits to the adversary. The inferior power cannot respond in kind to all levels of attack, but it must have the credible capability of a retaliatory response which overshadows the benefits from an attack.

Logical flaws also accompany this deterrence strategy for French defense planners and politicians, and in some respects the flaws significantly preclude a cohesion and consistency in important areas of French national security policy.

Economic problems also plague France and these problems will worsen in the future as the superpowers continuously redefine and raise the level of sophistication necessary in nuclear weapon systems to ensure a credible and reliable retaliatory force.
Further, the French relationship with the United States is fundamentally different from the relationship Great Britain enjoys. This has not been a development through happenstance, but one by design. The French have serious reservations about relying on the American nuclear guarantee although it undoubtedly does enhance French security. Moreover, the French decided long ago that their sovereignty over defense policy formulation would not be subsumed into the NATO infrastructure. The result has been an American reluctance to transfer nuclear weapon technology to France and an all too visible trend of a widening gap between the sophistication of French and superpower nuclear weapons systems.

The Modernization Plans Under Mitterand

The opinions held by socialist, President Mitterand, of the French nuclear forces have undergone a complete turnabout. Mitterand expressed opposition to the forces in the mid-1960s. He now overwhelmingly advocates not only the forces maintenance, but their modernization and enhancement as well, during this decade.

Indeed, Mitterand's current conservative views in this realm are a marked departure from views he has espoused in the past. Only two years ago, Mitterand was calling for the elimination of nuclear weapon stocks. But Mitterand's views gradually moved to the center as reflected in his tacit acceptance of the idea of an independent nuclear deterrent in 1978, but even at this time he did not advocate an expansion of France's nuclear potential. He instead proposed that the forces remain at the levels existing in 1978. More recent statements by Mitterand reveal his perceptions of the growing imbalance in theater nuclear forces in the European arena and his belief that
remedial actions must be taken by France and NATO. For example, he has stated that, "the national nuclear deterrent strategy is the only means of reducing the danger of war. It is necessary to continue the modernization of our tactical and strategic forces giving priority to the naval component in view of the more promising state of the art in this field."147

The evolution of Mitterand's position since the mid-1960s to a tenacious support of the French strategic nuclear forces mirrors developments in the domestic political spectrum, and coincides with the relative heightening of tensions between the East and West. The end of the 1960s witnessed the demise of American strategic supremacy, but this was partially compensated for by the rapprochement between the superpowers. When the relative period of calm dissipated and Soviet modernization of theater nuclear forces ensued in the late 1970s, strategic parity between the superpowers and the growing imbalance in Europe made the American nuclear guarantee increasingly suspect.

As a consequence of these strategic and theater developments, the French government has enunciated strong support for a redressing of the theater imbalance caused by the Soviet deployment of the SS-70 IRBM and the Backfire bombers. The plans of NATO to modernize its long-range theater nuclear forces are viewed favorably.

For the most part Mitterand has re-affirmed a nuclear bias in defense allocations and has halted the erosion in expenditures for strategic nuclear forces which began in the early d'Estaing years. The 1982 defense budget, adopted by the National Assembly in November, 1981 amounted to FFr 142,970 million or almost $23 billion, a nominal increase of 17.5 percent from the previous year. A hefty proportion of the funds allocated, nearly one third.
were designated for modernization and research and development of the French nuclear forces.\textsuperscript{148} The budget provided funding for a seventh SSBN, development of a new mobile land-based ballistic missile, and a tactical nuclear missile.\textsuperscript{149}

The 1983 defense budget continued to emphasize nuclear programs which, according to the French Cabinet, revealed "the priority given to development of the submarine-based deterrent force." Although, nominally the budget rose FFr 158,860, an increase of ten percent, this was insufficient to outpace inflation.\textsuperscript{150}

A static delineation of the French strategic nuclear forces aptly demonstrates that the French have tried to emulate the superpowers, at least on the surface, by deploying a strategic triad of nuclear forces on submarines, strategic aircraft, and land-based ballistic missiles.

The SLBM force currently rests on five SSBNs, the last of which, Le Tonnant, was commissioned in mid-1980. Each submarine is equipped with 16 missiles with a range of 1850 nautical miles, and each missile carries one warhead of one megaton yield with penetration aids (to foil Soviet ABM capabilities).\textsuperscript{151} A sixth SSBN, L'Inflexible, will be launched in 1985 and will be an "inter-generational" type submarine between the Redoutable class currently deployed and a new generation SSBN being considered for deployment in the 1990s.\textsuperscript{152} Although of similar displacement, L'Inflexible will take advantage of technological advances in guidance, diving, detection, and noise reduction systems. Moreover, it will be equipped with a new missile, the M-4, which will also be retrofitted to the other five SSBNs (although it is not for certain whether the first SSBN commissioned will be retrofitted).\textsuperscript{153}
The M-4 missile will incorporate advances being made in French missile technology. At present, none of the French strategic forces are MRVed or MIRVed. The M-4, however, will be MRVed with probably six warheads of 150 kiloton yield. The M-4 will also have a range improvement of 35 percent (to 2500 nautical miles).  

Mitterand seems to be resolutely determined to increase the quantity, as well as quality of the French sea-based deterrent. The construction of a seventh SSBN was announced in July 1981 and according to the Minister of Defense, Charles Hernu, the number of SSBNs in the French Navy could increase to eight by 1988. The communiqué from the President's office which announced the plans for the seventh SSBN stated that Mitterand ordered "a minimum of three French nuclear submarines be constantly on patrol outside French waters..." Hernu elaborated that France should actively encourage arms negotiations between the superpowers while modernizing and increasing its own nuclear forces.

The French silo-based missile force, the Force de Dissuasion on the Plateau d'Albion, consists of 18 S.3 IRBMs which recently replaced the S.2 missiles in the same silos (during 1980-1982). The S.3 IRBM represents a range improvement of 150 nautical miles (from 1700 nm to 1850 nm) and a significant warhead yield enlargement (from 150 let to 1 Mt). However, qualitative and quantitative increases in Soviet theater nuclear forces make this leg of the triad highly susceptible to a Soviet first strike. Particularly the Soviet deployment of over 300 SS-20s, each, MIRVed with three highly accurate (CEP of 250 meters) warheads of 150 kiloton yield, seriously threatens the comparatively exiguous French force.

Perceptions of the vulnerability, of course, have not gone unnoticed by
the French. Discussions concerning a feasible replacement and whether it should be mobile or not have been going on longer than Mitterand has been President. International Defense Review posits that two somewhat dissimilar schemes are the leading candidates: the first envisages a deployment of approximately 30 missiles, each with three warheads, into hardened fixed silos; the second, more complicated scheme would entail approximately 100 single-warhead missiles mounted on vehicles which would be transported around France on Transall aircraft. Decoy missiles would also be flown (a kind of air-based "shell game") to make targeting more difficult. During a crisis situation, "On the first alert, the aircraft would fly to their assigned military bases and, on the second, the vehicles would move to the missile launch position."

Close examination exposes the potential problems of either plan. With continuous incremental improvements in Soviet missile accuracies and the relative ease of increasing warhead yields, it is at least questionable whether a new land-based force of the size, even if very hardened, would significantly increase the invulnerability of the leg of the French triad. The second option raises issues of reliable command, control and communication not unlike the sea-based forces, and it might not solve the invulnerability conundrum either. Whether the expense is worthwhile for either mode, or for that matter any mode, is a difficult question to be faced alike by French military strategists and politicians. Furthermore, each plan unnecessarily places more military targets on French soil which does not seem wise should deterrence fail in the European theater.

Although the word "triad" has been used earlier to describe the configu-
ration of the French strategic forces, the term will probably not be applicable to the French nuclear force structure beyond 1985. The air-based component of the French strategic forces consists of 37 Mirage IV A strategic bombers supported by eleven KC 135 mid-flight tankers which afford the Mirage IV As their strategic character. This provides the bombers an attack radius of 1735 nautical miles and each carries a single AN-22 gravity bomb of 60 kiloton yield. The fleet is aging, obsolescent, and there are grave doubts as to whether the planes could even penetrate Soviet air defenses. They too, like the French IRBMs, are highly vulnerable to a first strike attack. They are also very expensive to maintain and the force's credible lethality is small especially in comparison to the submarine force. In view of these realities, the French have already decided to phase out by 1985 all but 15 of the Mirage IV As which will very likely be used for strategic reconnaissance and in tactical support modes. Despite speculation that a force of Mirage 4000s equipped with new ASMP (Air-Sol-Moyenne Portee) tactical nuclear stand-off missiles may secure French an air-based strategic force after 1985, "the continuing absence of a decision to procure a new strategic bomber cast[s] some doubt on the future of this leg of the French deterrent." If realistic strategic planning plays a determinative role in deciding whether the air-based component of the strategic triad should be relinquished to more cost-effective and militarily effective equipment procurement, then in all likelihood the French strategic force configuration will contract into a strategic "diad" after 1985.
French National Security Policy and the Force de Dissuasion

The French, to a somewhat greater degree than the British, value the maintenance of their independent nuclear deterrent. The French credit more than national security value to their nuclear deterrent. As Lawrence Freedman has maintained in a recent analysis of the British nuclear deterrent:

In France, a mystique has developed around the independent deterrent, in that it has become associated with some deep sense of national destiny. No politicians, even communists, dare question its value. In Britain, by contrast, little patriotic symbolism has been generated around the nuclear force, and few outrageous claims have been made as to its military value. 164

Consequently, whether or not an independent French nuclear force of strategic capability should be maintained is not, in the French domestic political arena, a moot question at this time. So Edward Kolodziej explains in "French Security Policy: Decisions and Dilemmas,"

Even before the Socialist victory, there was broad agreement across the French political spectrum that the force de dissuasion should be the centerpiece of French military planning, . . . that France should retain and even increase the capability of its nuclear strike force, and that the force should essentially be a countervalue system. All concurred, moreover, that French nuclear forces should remain under tight national control. 165

As a medium nuclear power, French deterrence strategy cannot operate on an equivalent basis with the Soviets. Like Great Britain, France must be content with a minimum or proportional deterrence posture due principally to the imposition of technological and economic constraints. As such, the sustenance of deterrence, in this context, is crucially dependent on the ability of the French to present a credible and reliable capability to respond in retaliation, should the adversary contemplate aggression against France's
vital interests. The potential for retaliation must be carefully tailored
to convey to the adversary that the punition of aggression would clearly exceed the benefit expected from it. Hence, with its modicum of missiles, France must target what it presumes the Soviets to value most—civilian population and industrial centers. Even if the French warheads were highly accurate and possessed lethal capabilities against hardened military targets, the optimal strategy would still consist of countervalue targeting.

The credible posture under proportional deterrence, however, is also contingent upon a resolute and staunch leadership, which is perceived to be able to make the decision to actualize the threat should deterrence fail. The possibility that forces may be employed is at least as crucial as the objective capability to perform the retaliation. This is of particular importance and relevance to the French position. First, because it is a medium-nuclear power, France's deterrence posture, more so than the posture of the United States vis-a-vis the Soviet Union, requires to a greater degree, "steadfast, political leadership...[able]...to manipulate the essentially psychological determinants of deterrence." As France's strategic nuclear force is much smaller than the Soviet's strategic nuclear force, French intentions to respond to a preemptive attack must be more resolute and less obscure. France's lack of formal participation in NATO would make these pressures even more burdensome on the French leadership if a serious crisis threatened France's vital interests.

Outside of the NATO infrastructure, French declarations that independent nuclear decision centers contribute to the enhancement of Western deterrence are more cogent and doctrinally consistent (although probably not more credible) than similar declarations made by the British who explicitly confide in the American nuclear guarantee and whose security is formally tied to NATO.
France's continued peripheral participation in NATO symbolizes its hesitation about relying too extensively on the American nuclear umbrella. The French have no qualms about expressing their reservations concerning the protection of French vital interests through the American strategic guarantee. Indeed, therein lies the justification for the French Force Nuclear Stratégique. As David Yost explains,

French policy holds that only national nuclear forces can protect national interests, and that France's security is ultimately dependent on France's ability to threaten the Soviet Union with unacceptable damage -- damage that would exceed in value whatever benefits the Soviets might seek in conquering or destroying France. 167.

Moreover, although the views of General Mery, who held the post of French armed forces chief of staff, have been somewhat successful in enlarging the French notion of security interests, "French announced and operational military strategy . . . [continues to emphasize]. . . France's independence, freedom of maneuver in threatening or using its military forces, and the limits of credibility of the French nuclear deterrent beyond its identification with the inviolability of French territory."168 Mery had tried to promulgate the notion that French national security should be intertwined with an enlarged sanctuary encompassing "not only French national territory but "Europe and its immediate approaches, including in particular the Mediterranean basin."169

One must conclude that at least announced French security policy is founded on and derives its potency from the French strategic forces although it will reluctantly admit the benefits of the American nuclear guarantee and the inseparable destiny from France's European neighbors in NATO. This is much unlike the averred security policy of Great Britain which explicitly
stresses the role of NATO and the American strategic nuclear guarantee in providing for Great Britain's security to almost exclusion of the British strategic nuclear forces. As Jean Klein has summarized recently,

Opting in favor of nuclear deterrence is a central element in French military policy and nothing so far indicates a change in this respect. . . the French government is conscious of the fact. . . that the threat of its use [the nuclear weapon] is credible only for the defense of vital interests. However, the latter are not interpreted in a limited way. . . Moreover, the highest authorities have vowed that France's fate is linked to its neighbors' and that France would not remain indifferent to an aggression aimed at them. Consequently, Europeans will benefit indirectly from the existence of an additional nuclear decision center on the continent if the SNF succeeds in casting a supplementary factor of uncertainty into the strategic equation and does not appear just as a simple appendix of the American system. It is therefore crucial that France possesses adequate nuclear means of its own and that it preserves its autonomy in deciding on their use. 170

The Credibility of the French Strategic Nuclear Forces

The capabilities necessary to support declarative security policy can be significantly out of proportion to the capabilities actually possessed by a nation-state. Is this the case with France, especially given French affirmations of the unreliability of the American strategic nuclear guarantee? Jean Klein confidently asserts that "Today, France has at its disposal a nuclear capability which allows it to practice with success a defense strategy of proportional deterrence and to inflict on its adversary losses completely unrelated to the coveted stakes. . . To implement such a strategy, France possesses sufficient retaliatory power." 171 Is this so?

The crux of the matter is whether France does indeed possess a credible retaliatory capacity as Jean Klein contends. Numerous inponderables pervade such a consideration. Perhaps the most basic is the difficulty in estimating
what level of forces is adequate to maintain deterrence, given that the very essence of deterrence (i.e., an unemployment of forces) precludes an accurate assessment of how opposing capabilities might interact and offset one another in an actual conflict situation. Another consideration which hampers the setting of appropriate force levels is exactly what is one trying to deter? What level of antagonism will be tolerated? Does France only hope to deter actual conflict with the Soviet Union or does France desire to deter excessive Soviet political pressure and influence in Western Europe also? The more vague the manner in which vital interests are proclaimed, the more difficult these questions are to answer.

The French nuclear forces are obviously designated to deter a direct assault, --whether conventional, nuclear, or both -- on French soil. But what the French Government means by "vital interests" is neither clear nor necessarily constant over time and this equivocality is intentional. Jean Klein explains the rationale behind this: "By maintaining a deliberate ambiguity in the definition of its "vital interests" and by reserving the right to act in the approaches to its territory at an opportune time, . . ., the French Government presents the potential aggressor with an unknown factor which complicates its strategic calculus and can make the potential aggressor give up his project."\textsuperscript{172}

For the purposes of this discussion, it is sufficient to appraise the dissuasive ability of the French strategic nuclear forces in deterring a Soviet first-strike. Ascending Soviet capabilities in theater nuclear forces and anti-submarine warfare deserve the most consideration because they directly threaten the French arsenal. As Paul Stares has defined the question:
"Its capability to deter a potential aggressor rests on there being a sufficient proportion of the retaliatory forces available at all times, that can survive a preemptive attack, functions reliably, penetrate... Soviet defenses... and still deliver as much damage as deemed to be "unacceptable" to the Warsaw Pact."^173

A secure retaliatory capacity depends foremost on the survivability of the forces, presupposing that the forces can accomplish their task once launched. Survivability is also of crucial importance in influencing the adversary's perceptions of the credibility of the forces. It involves the ability of the forces to withstand attacks and to remain operational subsequent to attack. Not only delivery systems, but support systems such as early warning and C3I facilities must be included in an assessment. In addition, the degree of survivability depends on the nature of the attack -- whether it is anterior to a political crisis, anticipated to any extent, or is initiated without ostensible warning.

As mentioned earlier, the Soviet SS-20 IRBM with its counterforce accuracy presents the most ominous threat to the West's theater nuclear systems. The French Mirage IV A force, squadrons of IRBMs, SSBNs in port for maintenance or refit, and C3I systems must be considered highly vulnerable to a Soviet first-strike. The greatly improved accuracy of the SS-20 (CEP of 250 meters) permits the use of smaller warheads which would minimize collateral damage (if in fact this is of any consequence in a densely populated area such as France or Great Britain). The IRBMs are undoubtedly, the most vulnerable component and along with the Mirage IV As "are more targets than a deterrent."^175 As incredible as it may seem, this realization has
been speciously subsumed into French nuclear strategy as "French commentators now speak of the IRBM force as a lightening rod which, when struck by enemy forces, would justify a massive retaliatory attack by France's sea-launched missiles. The destruction of the French IRBMs would violate the French sanctuary and clearly reveal enemy intentions of an attack against French territory." Such an argument is not a sufficient justification for maintaining the land-based nuclear forces.

The French might redress the vulnerability of the land-based missile system by super-hardening missile silos, by moving to a mobile missile system, or by implementing a "launch-on-warning" strategy. However, each of these courses presents tactical difficulties. For instance, given the distance between the Soviet and French forces, it is debatable whether a launch-on-warning strategy is even possible.

The French SSBN force is clearly the most potent leg of the triad. French SLBMs now contain 80 percent of the total deliverable megatonnage of the French strategic forces and this will increase to over 90 percent by 1988 if present modernization programs remain intact. Submarines at sea represent the most invulnerable part of the French nuclear deterrent but this invulnerability could gradually diminish through the decade as the Soviets make technological advances in ASW capabilities. However, numerous variables will likely continue to make the submarine platform the most attractive for France and Great Britain. It is believed that "French nuclear submarines are considerably noisier than their NATO counterparts, thus facilitating their detection and destruction," but with their current modernization plans the French are increasing the operation patrol area of the submarines with the M-4 missile and are developing less noisy submarines.
Additionally, antisubmarine warfare is a highly complex mission which involves the sophisticated coordination of numerous ASW platforms. Moreover, given the potential destructive capability of each SSBN, an actual ASW engagement by the Soviets, to be successful, would have to almost simultaneously destroy the two or three French SSBNs. One might posit this to be a very conceivable mission for the Soviet SSN armada, but such a scenario in which the Soviets could focus their entire ASW capability on the French SSBNs at sea is entirely implausible. The French and British sea-based deterrents will continue to remain relatively invulnerable because the Soviets have to distribute their ASW capabilities across the French, British, American and NATO components of the West's sea-based deterrent forces.

One additional factor plays a role in the credibility of the French nuclear forces as it does with the British force. The limited Soviet ABM system does not come close to neutralizing U.S. offensive firepower, but it does present difficulties for the French and British deterrent posture. The 1972 U.S.-USSR ABM treaty and the 1974 Protocol permit the Soviets a deployment of 100 ABM interceptors around Moscow although they only deploy 64. Although the system is antiquated, "it still presents a formidable defense against medium-range nuclear powers with their relatively small number of re-entry vehicles and unsophisticated penetration aids." Trident should remedy this situation for the British but the French will probably continue to face this quandary in the 1990s. As Paul Stares posits, "The British and French can only hope that the number of Galosh launchers never exceeds 64 and that the logic of ABM constraints remains true. In the final
analysis the ability of France to penetrate Soviet defenses effectively will rest on the careful choice of targeting..." 181

Problems and Trends of the 1980s

Like it or not, strategic realities are steering the French to a strategic nuclear force configuration based almost exclusively on nuclear submarines. This seems an optimal course to follow if C3I systems are hardened and continuously upgraded. The SSBN appears to be the most promising platform for the French deterrent given its invulnerability at least for the near future. Further, the French would be wise to divert all budget allocations set for strategic nuclear modernization to the submarine leg of the present triad. Such a concentration of resources would be more cost-efficient and it might enable France to partially redress the technology gap in nuclear weapons' development with the superpowers which seems to widen year by year. For example, there have been twenty-year lags between U.S. deployment of MRV and MIRV technologies and prospective French deployment of the same technologies. 182

Chances are less than slim that the French will pursue construction of standardized nuclear weapon systems with the U.S. as has Great Britain, even though it would be beneficial from a military perspective. Domestic political realities, lack of complete French participation in NATO, and the problems France observes the British having in basing procurement weapon decisions on U.S. decisions, make such a development all but impossible in the
near future.

Although French strategists are reluctant to admit it, the credibility of the French deterrent is, like the deterrent of Great Britain, dependent on the American strategic nuclear guarantee.
Conclusion

The Western powers are each conducting extensive modernization of the sea-based components of their strategic nuclear forces. While a growing reliance on submarine launching systems carries with it numerous problems, chiefly with supporting C3I systems and incremental improvements in Soviet ASW capabilities, such a reliance appears to be plagued with fewer problems than land-based systems. This will become even more evident as the superpowers begin to deploy their next generation of strategic weapons in the late 1980s, most of which will possess a counterforce targeting potential. These capabilities will in turn make land-based systems more vulnerable to surprise attack and further increase the attractiveness of sea-based systems.

Given their limited resource bases, the submarine launch platform is certainly the most appealing option for France and Great Britain. The smaller sizes of their strategic forces necessitate that the level of invulnerability of a strategic system be the most salient consideration in choosing between procurement alternatives. The United States must also continuously secure its retaliatory options and the sophisticated Trident system should credibly accomplish this task well into the 21st century.

Although Soviet ASW capabilities do pose a possible threat to the sea-based deterrents of the Western powers, it is likely that the advantage will remain with the SSBNs during the 1980s and 1990s. Antisubmarine warfare is an enormously complex activity requiring the integrated coordination of many diverse platforms. Moreover, as mentioned earlier, given the destruct-
tive potential of even one SSBN, a success rate of less than 100 percent would have grave consequences.

The deployment of counterforce warheads on the Trident II system seems to be a less optimal, if not altogether unnecessary, course of action. It is debatable whether the United States needs a counterforce targeting potential in its retaliatory strike-force. The deployment rests on the assumption that deterrence would be enhanced if the U.S. President were given the option of destroying hardened Soviet targets should the Soviets launch a less than all-out nuclear attack. This is a dubious proposition and it does not clearly justify the over $8 billion that will be spent on research and development of the D5 missile alone. These funds would be better expended on incremental improvements to the evasive techniques and overall invulnerability of the Trident system. Additionally, the D5 missile, in all probability, will not be a stabilizing element to strategic deterrence.

Rather than actually deploying the D5 missile, American interests in maintaining strategic deterrence would be more appropriately served by using the D5 missile as a bargaining chip in a new round of arms control negotiations. Given the American advantage over the Soviets in SLBM and SSBN technologies, this could prove to be a very effective tactic in obtaining curbs on Soviet land-based systems. Furthermore, future negotiations should also work to establish constraints on ASW capabilities in order to continuously ensure the credibility of the retaliatory capacity of each side. Here too, the advantage of the United States in ASW technologies might provide some useful leverage in negotiations with the Soviet Union.
NOTES


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8 Ibid., p. 17 and p. 20.


13 The SALT II Treaty, p. 102.

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16 Burt, p. 42.


20 Ibid., p. 984.

21 Ibid., p. 985.


23 Ibid., p. 13.


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27 Ibid., p. 1820.


29 Ibid., p. 1907.


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39 Ibid., p. 32.

40 Ibid., p. 33.


42 Ball, p. 33.

43 Ibid., p. 33.


46 Ibid., p. 598.

47 Ibid., p. 598.


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54 Trofimenko, p. 33.
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56 Ball, p. 41.
59 Ibid., p. 597.
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65 Ibid., p. 503.
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67 Ibid., pp. 504-505.
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69 Wit, p. 37.
70 Byers, pp. 506-507.
71 Ibid., p. 506.
72 Wit, pp. 31-32.
73 Ibid., pp. 36-37.
74 Ibid., pp. 35-36.
76 Wit, p. 40.
77 Ibid., p. 40.
78 Ibid., p. 41.
79 Ibid., p. 41.
80 Byers, pp. 511-514.
81 Ibid., p. 508.
82 Ball, p. 49.
83 Byers, p. 508.
84 Ibid., p. 508.
86 Byers, p. 508.
88 Ibid., p. 213.
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93 Ibid., p. 430.
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96 Ibid., p. 1186.
97 Ibid., p. 1186.
98 George, p. 439.
99 Edmonds, p. 217.
101 "U.K. selects Trident as Polaris replacement," p. 800.

102 Ibid., p. 800.

103 Ibid., p. 801.

104 Ibid., p. 801.

105 Ibid., p. 801.

106 Edmonds, p. 217.


110 Ibid., p. 256.

111 Ibid., p. 256.

112 Ibid., p. 256.

113 Freedman, p. 86.


115 George, p. 442.


117 George, p. 443.


119 George, p. 444.

120 "U.K. Trident purchase under investigation: fears over impact on conventional equipment plans," p. 244.

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122 Freedman, p. 89.
123 George, p. 445.
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126 Ibid., p. 978.
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129 Ibid., p. 99.
130 Ibid., p. 91.
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132 Freedman, p. 95.
133 George, p. 435.
134 Ibid., p. 432.
135 Freedman, p. 92.
136 George, p. 432.
137 Freedman, p. 93.
138 George, p. 433.
139 Ibid., p. 433.
140 Freedman, p. 93.
141 George, p. 434.
142 Ibid., p. 435.
143 Ibid., pp. 435-436.
144 Freedman, p. 94.
145 "U.K. selects Trident as Polaris replacement," p. 800.
Francois Mitterand, quoted by Germain Chambost, p. 707.


Ibid., p. 1566.


Ibid., p. 233, and Chambost, p. 707.

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"Mitterand continues nuclear bias," p. 1566.

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171 Ibid., p. 461.
172 Ibid., p. 459.
173 Stares, pp. 235-236.
174 Ibid. p. 237.
177 Stares, pp. 239-240.
178 Ibid., p. 253.
179 Ibid., p. 241.
180 Ibid., p. 243.
181 Ibid., p. 243.
182 Ibid., p. 254.
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