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**U.S. Strategic  
Nuclear Forces:  
Deterrence Policies  
And Procurement Issues**

April  
1977



Congressional Budget Office  
Congress of the United States  
Washington, D.C.

U. S. STRATEGIC NUCLEAR FORCES:  
DETERRENCE POLICIES AND PROCUREMENT ISSUES

The Congress of the United States  
Congressional Budget Office

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PREFACE

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Before the Congress are requests for some \$11 billion for the operation and modernization of U.S. strategic forces in fiscal year 1978. Major modernization programs are proposed or underway for every element of U.S. strategic forces, and these programs are likely to shape the costs and capabilities of these forces for several years to come. This year the United States will also be engaged in strategic arms limitation talks with the Soviet Union. For these reasons, U.S. strategic policy is likely to be a major concern of the Congress this year.

This Budget Issue Paper outlines several alternative policies of nuclear deterrence and explores how each of these policies relates to the specific decisions that face the Congress this year. In particular, it discusses the policy on which current Defense Department planning is based and explores some alternatives.

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Alice M. Rivlin  
Director

March 1977

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## SUMMARY

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Before the Congress this year are major funding requests for the modernization of all elements of U.S. strategic forces. Which programs are funded should depend on what sort of nuclear deterrent policy the Congress wishes U.S. strategic forces to support. Among the considerations that will influence the choice of a deterrent policy will be:

- o the kinds of enemy actions to be deterred;
- o how this deterrence is to be achieved;
- o how U.S. strategic forces will be perceived by potential opponents and allies;
- o the effect of a given policy on the prospects for arms control agreements;
- o the costs of the forces required to support a particular policy.

There is no one "correct" deterrent policy. We will never know for sure what is required to deter. Observers of strategic matters have differing views about how and why a nuclear war might begin. Thus, they do not agree about how it might best be prevented. To the extent that views differ on these matters, they will also differ on the appropriate make-up of strategic forces.

### Current Policy

It has long been U.S. policy to design strategic forces to be able to withstand a large-scale attack by the Soviet Union and then launch a major retaliatory strike. The nature of this retaliatory strike has changed markedly in recent years, and this change underlies most of the current force modernization programs. Once it was thought sufficient that a retaliatory strike could cause "unaccept-

able" damage to Soviet cities; now a retaliatory strike is intended to delay for as long as possible the postwar recovery of Soviet national power and influence.

This new retaliatory doctrine requires that many more targets be attacked. As a result, many more weapons are required. The new doctrine also requires that Soviet military installations be attacked, and for this reason, U.S. forces must be able to destroy a large number of hardened targets. The programs to develop a new ICBM (Intercontinental Ballistic Missile), the M-X, and to procure a new penetrating bomber, the B-1, have been designed specifically to satisfy these increased requirements.

Some question the wisdom of the new retaliatory doctrine. They claim that the uncertainties surrounding nuclear war and its aftermath are so great that no practical calculation of force requirements can be based on the need to inhibit recovery. Further, many find the rate of recovery to be an irrelevant focus for a deterrent strategy; it seems unlikely that any national leader would take the desperate step of initiating nuclear war on the belief that after 10 or 15 years his nation would be in a position "superior" to that of his opponent. Finally, some fear that the acquisition by the United States of large numbers of weapons capable of destroying hard targets might appear to the Soviets as the first step toward acquiring a first-strike disarming capability.

Current force modernization programs might be better justified as supporting a so-called second-strike counterforce strategy. The Department of Defense has not advanced this justification, but some critics have suggested that it is the true motivation for current planning. A counterforce strategy is based on the belief that, rather than attacking U.S. society, the Soviet Union might attempt to destroy U.S. land-based strategic forces while leaving U.S. cities intact to serve as hostages against any U.S. retaliation. Proponents of a counterforce strategy argue that to deter such an attack the United States must maintain forces able both to destroy those Soviet land-based weapons not used in the initial attack and to threaten the destruction of Soviet cities if U.S. civilian targets are attacked.

Critics of this strategy point out that to use surviving forces to attack remaining Soviet forces would only complete the process of disarmament initiated by the Soviet attack. Other critics deny that there would be any practical political distinction between an attack on all our land-based strategic forces and an all-out attack on U.S. cities. To maintain forces in support of a strategy that depends on this distinction, these critics assert, is foolish, and current modernization programs (particularly the B-1 and M-X programs) merely reflect the outmoded belief that military forces should be designed to fight other military forces.

#### Alternative Deterrent Policies

The two deterrent policies that are consistent with current programs are not the only policies possible. Alternative deterrent policies would require different forces than are now planned. In some--but not all--cases, these alternative forces would also be less costly.

The simplest alternative to current policy is a policy of finite deterrence. The principal characteristic of this deterrent policy is a threat and a capability to respond to any nuclear provocation with a major attack against Soviet cities even after a major Soviet attack on U.S. forces. No capability to take other actions would be provided. This strategy would require fewer warheads than does current policy, and only a minimum capability for destroying hard targets would be needed. It would allow the retirement of about half of the current ICBM force and the cancellation of the B-1 and the M-X programs.

Also possible is a policy that recognizes that nuclear weapons may have utility when used in limited numbers for either tactical or coercive purposes. A policy to provide limited nuclear options would require forces that could engage in an extended campaign of limited nuclear attacks and still pose a threat to Soviet cities in the event that limitations were not observed. Limited operations would require improved warning, surveillance, and communications systems, but they do not in themselves justify either the B-1 or the M-X program.

A policy of seeking essential equivalence between U.S. and Soviet forces is another alternative. It is based on the belief that nuclear weapons constitute a highly visible symbol of national power and intent. Proponents of this view argue that if U.S. forces are perceived as inferior to Soviet forces, the United States could expect bolder actions by the Soviets and wavering support from allies. Unambiguous parity with the Soviet Union in virtually all important aspects of strategic force capability would require the United States to expand current programs of force modernization.

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## CHAPTER I INTRODUCTION

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The nuclear forces of the United States are usually divided into two broad categories, tactical nuclear forces and strategic nuclear forces. Both forces have the same primary function: to deter any opponent of the United States from the use of nuclear weapons. What distinguishes the two are the roles they might be called upon to play if deterrence should ever fail. Tactical weapons are designed to achieve an immediate battlefield advantage over opposing conventional or nuclear forces. Strategic forces are designed to destroy an enemy's ability to wage war by destroying military establishments, industrial capacity, transportation and communications networks, government facilities, and population centers. This paper will be concerned only with U.S. strategic forces. 1/

The major components of U.S. strategic forces are long-range bombers, land-based intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs). In addition, strategic forces include the systems for controlling the use of strategic weapons, giving warning of impending attack, and defending against such attacks. Strategic forces could conceivably be used against opponents elsewhere in the world, but U.S. forces are structured principally to counterbalance Soviet strategic forces. Changes in U.S. force requirements are generally based on changing perceptions of Soviet intentions and capabilities.

The Department of Defense (DoD) is requesting \$11 billion (about 9 percent of total defense spending) for strategic forces in fiscal year 1978. Included in this request are funds for the modernization of these forces through the development and procurement of new weapons systems.

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1/ For a discussion of U.S. tactical nuclear forces, see Planning U.S. General Purpose Forces: The Theater Nuclear Forces, Congressional Budget Office, Budget Issue Paper, January 1977.

The nature and capabilities of U.S. strategic forces can be changed only gradually. The bulk of existing forces will remain in operation for some time, and decisions made this year will affect the total force only at the margin. But expenditures this year in many cases represent only the early phases of multiyear modernization programs, and new systems developed today will remain in the force for many years. Decisions made this year on funding for strategic forces, then, will determine both the capabilities and the costs of U.S. strategic forces for many years to come.

U.S. strategic forces have always been diversified, and deterrence has never depended entirely on one kind of weapon system. The elements of the present strategic TRIAD--bombers, land-based ICBMs, and SLBMs--have different capabilities and vulnerabilities. In some cases one element performs a mission the others cannot; in other cases their capabilities are redundant. Thus, they provide increased assurance that required missions will be accomplished. Because each of the elements has different vulnerabilities, any attempt to destroy all elements would prove exceedingly difficult. In this way, each element helps to protect the others. Each element of the TRIAD plays a role in an overall strategy of deterrence, and if a change is made in the capabilities or the mission of one of the elements, there will be a corresponding change in the demands placed on the remaining elements.

At present, major modernization programs are underway for all the elements of U.S. strategic forces. New submarines, bombers, and missiles are all being developed or procured, and programs to improve warning systems, defensive capabilities, and command and control systems are ongoing or under consideration. This year the Congress has an unusual opportunity to consider strategic forces as a whole, rather than having to deal with individual weapon systems in isolation.

Deterrence of nuclear war is based on the threat that the United States will respond to certain provocations with certain actions. What weapon systems are to be procured will be determined primarily on the basis of what provocations we will prepare to meet and what actions we will be ready to carry out. What appear to be appropriate responses in some circumstances may be totally inappropriate in others. The threat to respond in a particular manner may deter an enemy with one set

of objectives and perceptions. It may only encourage him to widen a conflict if his objectives and perceptions are different. Different views about the behavior of potential aggressors and about the nature of possible nuclear confrontations suggest different responses. These, in turn, require different forces. The requirement that strategic nuclear forces must deter nuclear war is not by itself sufficient to determine the structure of these forces. It is necessary to identify the situations that may lead to nuclear war and to specify how deterrence is to be achieved in these situations.

Being able to carry out a retaliatory strike is not the only requirement for nuclear forces. Strategic forces are designed for appearances as well as for possible use. Forces must be designed so that a potential opponent is convinced that he has little to gain and much to lose by initiating nuclear war. Further, they must be sufficient to convince the world at large that the United States will not retreat from its commitments in the face of a nuclear threat. It does no good to possess a powerful deterrent force if at some critical moment it is not perceived as such.

Another important consideration in designing strategic forces is their effect on the possibility of negotiating arms limitations. The debate over whether or not certain systems should be developed or maintained as "bargaining chips" has been going on for several years now, and it promises to continue until conclusive agreements are reached. In the interim, it is important to ask whether any particular decision on nuclear weapons will make arms control agreements more or less likely. For example, if U.S. penetrating bombers were replaced by standoff bombers armed with cruise missiles, it might be very difficult for the United States ever to accept an arms limitation agreement restricting the deployment of cruise missiles.

What forces are bought, then, depends on what we may want them to do, what we want them to look like, and how they will affect arms control negotiations. These things depend, in turn, on how we imagine that a nuclear war might begin and on what might motivate an aggressor both on a battlefield and at a bargaining table. An opponent's motivation will depend on, among other things, his views of our strength and intent as reflected by our nuclear forces. We find that we have come full circle; everything seems to

depend on everything else. To the extent that views differ on any of these matters, views will differ on what constitute appropriate nuclear forces.

Because current forces evolved over a period of years at the same time that deterrent policies were evolving, all force elements were not designed to support the same policy. Some have questioned whether the planned improvements in fact represent a step toward a coherent deterrent policy and, if so, whether this policy is the publicly articulated policy. What is clear is that this current policy is being used to justify major programs of force modernization. Some have suggested that other policies might be preferable. At least some of the alternatives demand less expensive forces to implement them.

This paper outlines several points of view on strategic force design. It explores what each implies about the specific decisions that face the Congress this year. Chapter II provides a brief description of current deterrent policy, it notes the objections that are sometimes raised about this policy, and it suggests possible alternative deterrent policies and associated forces. Chapter III is a more detailed description of the particular force improvement programs now before the Congress. It discusses how each program is or is not consistent with the various deterrent policies outlined. Chapter IV presents a summary of the specific decisions the Congress might make if it chose to adopt one of the alternative policies and the costs associated with these decisions. This paper is not a criticism of current strategic policy or programs. It is intended, instead, to point out that differing policies of deterrence are possible and that they suggest that different forces be built.

Deterrence is by necessity an uncertain business, and when nuclear weapons are involved, the uncertainties are particularly great. Deterrence is based, after all, on an opponent's willingness to take risks, and on what he believes to be at stake in a confrontation--matters about which there can be little assurance. Nuclear war is a desperate undertaking contemplated by nations or governments only in the most desperate circumstances. What might motivate or deter a national leader in such extraordinary circumstances may bear little resemblance to what would motivate or deter him in a time of peace and calm. For many years it was the official U.S. position that the Soviet

Union would be deterred from launching nuclear war by the threat of massive civilian destruction. But how can we know that in a crisis the Soviet leadership would not be more fearful that their military forces might be destroyed, leaving Soviet borders undefended? Perhaps they would most fear a loss of governmental functions, followed by a loss of internal control. Indeed, we have very little understanding of what would deter us in a severe crisis.

One might hope to devise forces that would be appropriate to deter any possible threat by any possible opponent, but not only would such a course be immensely costly, it could also be self-defeating. For example, it has long been suggested that the United States should possess the capability to do more than simply obliterate the homeland of an aggressor in a spasm of retribution. What, it is asked, would we do if a small number of nuclear weapons were used against selected targets in the United States? Would we in fact retaliate with a strike that would destroy the society of an opponent, knowing that he could still launch a similar strike against us? Most likely we would not, and we have found it desirable to build forces to retaliate with a limited number of weapons. But now a new question can be raised: Does not the preparation to fight a limited nuclear war make such war more easily survived, more "thinkable", and thus more likely? If so, then deterrence has been weakened, not strengthened.

This example illustrates two different strategies of deterrence, and the nuclear forces required to implement them are quite different. Both strategies cannot be adopted. It is not possible to threaten convincingly that all-out war will be the result of any provocation and at the same time maintain the capability for limited nuclear war. But there is no easy way to choose between these strategies. We have no way of knowing whether a limited nuclear conflict could remain limited, thus avoiding total war, or whether some world leader, convinced that this were so, might initiate a limited war only to have his conviction proved false.

All of this is meant to illustrate that we can never be sure what deterrent policy is most appropriate. The Congress is faced, nevertheless, with the need to make choices today about what forces will be available in the future. The alternatives outlined here stem from certain assumptions about the way we and our opponents view the

world. No amount of analysis can determine which assumptions are correct. The intent of this paper is to lay out clearly the assumptions underlying each alternative policy. The choice among these alternatives must be made by the Congress.

A similar problem arises in considering the size of alternative forces. In considering the requirements for any deterrent strategy, there is always some uncertainty about "how much is enough." One can never be sure how effective particular weapons may be, how resistant to attack enemy targets may be, or how much damage must be threatened to deter an enemy. In the alternative force structures presented here, the number of bombers, missiles, submarines, and so on are illustrative only. Forces somewhat larger or smaller, or with slightly differing mixes of components, could probably be as easily justified. The main intent is to show the kind of forces required to implement the different strategies. The forces suggested represent goals toward which forces might evolve rather than definite end points. In all cases the suggested forces are consistent with the 1972 Strategic Arms Limitation Agreement and with the 1974 Vladivostok accords. This paper does not attempt to devise forces that take full advantage of these agreements. Instead, it suggests forces that seem adequate to perform the required missions even if larger forces would be permissible. There may be advantages in maintaining additional forces to obtain quid pro quo reductions in arms from the Soviets. Whether such additional forces would bring about the desired result is, of course, a matter of political judgment and is beyond the scope of this paper.

Similarly, in laying out alternative deterrent policies and their associated forces, their possible effects on future arms limitation agreements have not been dealt with directly. Future agreements may require adjustments in the overall size of alternative forces or variations in the exact mix of weapons needed to implement a particular policy. In general, though, the intent of a deterrent policy would remain the same no matter what the shape of future agreements, and it is likely that the forces implied by that policy would be similar to those suggested here.

CURRENT POLICY

Current Retaliatory Strategy

Current U.S. nuclear strategy depends on a secure capability to retaliate after a nuclear attack on the United States or its allies. The United States has stressed that under certain circumstances it would consider the first use of nuclear weapons, but it has long been U.S. policy to renounce the initial use of nuclear weapons in an attempt to disarm the Soviet Union. As a result of this policy, the United States has not maintained forces that could destroy a large fraction of Soviet strategic forces in a surprise attack.

This policy is based on both practical and strategic considerations. As a practical matter, only the land-based portions of Soviet forces could be attacked. Missile-launching submarines at sea are difficult to locate and attack. Even the most effective surprise attack would leave at least part of this potent element of Soviet forces undamaged and capable of retaliation against the United States. But even if it were possible to destroy a large part of Soviet forces, we would gain no security by building forces to do so. Their existence might lead the Soviets to fear a preemptive attack by us and encourage them in a time of confrontation to launch a preemptive strike of their own. Instead of planning strategic forces for a first strike, the United States has sought to design forces that could withstand an initial Soviet attack and still launch a retaliatory strike. The requirements of this retaliatory strike determine what forces are necessary.

A new and more demanding retaliatory strike now provides the basis for U.S. force planning. Publicly revealed for the first time in Secretary of Defense Rumsfeld's Annual Report for FY 1978, it differs markedly from the retaliatory strategy of earlier years. It was once thought sufficient merely to destroy given percentages of the Soviet population

and industrial base, inflicting damage terrible enough that no Soviet leader would risk war. 1/ Now, however, "an important objective of the assured retaliation mission should be to retard significantly the ability of the USSR to recover from a nuclear exchange and regain the status of a 20th century military and industrial power more rapidly than the United States." 2/ The old retaliatory policy sought only to inflict "unacceptable" damage on the Soviet Union. The new policy requires that we delay for as long as possible the recovery of Soviet national power and influence.

This change in policy implies different targets for a retaliatory attack. Under the old doctrine, the targets were industrial, governmental, and population centers--in short, Soviet cities. These targets were mostly soft. To destroy them, we did not need large numbers of highly accurate weapons. Weapons did not have to be highly reliable, since it did not matter if a few of these targets escaped destruction. Damage would be so widespread that two or three cities more or less did not seem important, and there was no need to attack isolated industrial or governmental targets away from major population centers.

Under the new doctrine, it is presumably necessary to destroy all installations essential to the recovery of the Soviet Union. Not only must major cities be attacked, but also those widely scattered installations important to a recovery effort. Thus, many more warheads will be needed for the new strategy than for the old. More accurate weapons may also be required. In recent years there have been numerous reports of efforts by the Soviets to disperse and harden military, governmental, and industrial centers and

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1/ In his Defense Department Report for 1969, for example, then Secretary of Defense McNamara said, "I would judge that a capability on our part to destroy say, one-fifth to one-fourth of (the Soviet Union's) population and one-half of her industrial capacity would serve as an effective deterrent. Such a level of destruction would certainly represent intolerable punishment to any 20th-century industrial nation." Annual Defense Department Report, FY 1969, p. 50.

2/ Donald H. Rumsfeld, Annual Defense Department Report, FY 1978, p. 68.

to protect the civilian population. If these reports are true, a small number of relatively inaccurate weapons will no longer be sufficient for our retaliatory strategy.

The importance of military targets marks another difference between the old and the new retaliatory doctrines. The old doctrine apparently implied no necessity to attack the military forces of the Soviet Union. It did not really matter if, after a massive exchange, one side still retained some conventional or nuclear forces. The prospect of grave civilian destruction was thought sufficient to deter the Soviets even if it were possible for them to emerge from nuclear war in a militarily "superior" position. Now, however, Soviet military forces--both conventional and nuclear--are apparently among the targets of a retaliatory strike. Military forces clearly contribute to the postwar power and influence of a nation, and the effectiveness of retaliation is now to be judged in part "by the size and capability of the enemy's military capability surviving for postwar use." 3/

It is not clear from public statements how much of the U.S. retaliatory force is devoted to this anti-military mission. The requirement to attack military targets, however, particularly those hardened to withstand nuclear attack, places great demands on the retaliatory force. If U.S. forces are designed to attack all Soviet military installations that may remain operational after a Soviet first strike, it is easy to imagine that the bulk of the forces could be assigned to this mission.

Whatever the exact nature of the retaliatory strike called for under the current doctrine, it is certainly much more demanding than that implied by the old doctrine. The Defense Department now estimates that "around 8,500 warheads" are required for "adequate coverage of all relevant mission targets." 4/ Certainly some (perhaps many) of these warheads would never reach their targets. They would be destroyed either by an enemy first strike or by enemy defenses around targets. Expected losses have not

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3/ Ibid.

4/ Ibid., p. 78.

been discussed in public, but it is difficult to imagine that several thousand of these warheads would not reach their targets. This is in marked contrast to the requirement in past years that each leg of the strategic TRIAD be able to perform the retaliatory mission by itself; the U.S. ICBM force, for example, has never contained more than 2,154 warheads. In 1969 it was calculated that a surviving force of only about 400 one-megaton equivalents should be sufficient for a retaliatory strike. Beyond this level, "further increments would not meaningfully change the amount of damage inflicted." <sup>5/</sup> Certainly, the target base of the Soviet Union has expanded in recent years, but by no stretch of the imagination can this growth alone account for the dramatically increased requirement for retaliatory forces.

The size of U.S. strategic forces is further increased by the requirement that U.S. forces be able to respond in kind to a variety of less than all-out attacks on the United States. We presumably need to maintain our retaliatory capability in all cases. If the targets of our limited response are different from those of our major retaliatory options, or if being ready to make limited strikes reduces the efficiency of forces for major retaliation, then additional forces will be required.

#### Forces Required to Support the Current Policy

The most striking feature of the new retaliatory doctrine is its requirement for an increased number of warheads. In addition, larger, more accurate warheads are required to attack both hardened civilian installations and military targets. Planned improvements in U.S. strategic forces seem to be designed to meet these requirements. Programs are now underway to develop a new ICBM, the M-X, and to procure a new bomber, the B-1. Both of these systems will contribute to U.S. capabilities to destroy a large number of hard targets. Their acquisition will greatly increase the number of warheads available for a retaliatory strike.

Current plans call for replacing between 200 and 400 Minuteman III missiles with the M-X. Like the Minuteman

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<sup>5/</sup> Robert S. McNamara, Defense Department Report, FY 1969, p. 57.

III, the M-X would carry multiple warheads, but these warheads will be larger, more numerous, and will have greater accuracy than those of Minuteman. The M-X will pose a threat to any hardened target in the Soviet Union, but in the view of most observers, a force of 200 could not destroy all of the Soviet ICBM force. Questions have been raised, however, about how a force as large as 400 of these highly accurate, multiple warhead missiles might appear to the Soviets. Some have suggested that the deployment of even a small number might be viewed as the first step toward a true disarming capability. The planned mobile deployment of M-X suggests that it is intended to survive an attack and then respond, not to be used in a first strike. But this may provide little reassurance to the Soviets. They may be more concerned with the capability of the system than with the intent behind it. They may also fear that mobile basing is an attempt to make more difficult the task of verifying compliance with arms limitation agreements.

The B-1 bomber will supplement and eventually replace the present bomber force of B-52s and FB-111s. The large payloads and potentially high accuracies of penetrating bombers make them capable of destroying large numbers of both civilian and military targets. The long flight times required for bombers to reach their targets would, however, provide sufficient warning time to allow Soviet ICBMs to be launched rather than be destroyed in their silos. For this reason, the planned procurement of the B-1 bomber is usually seen as improving U.S. retaliatory capabilities without posing a threat of a disarming first strike.

The most secure retaliatory weapon is the SLBM. Once at sea, missile-launching submarines are very hard to detect and attack. Programs are also underway to replace the current SLBM force with newer, more capable missiles and submarines. It has not yet been decided how many of these new Trident missiles and submarines will be bought, but they are expected to improve significantly the reliability of the U.S. sea-based deterrent forces.

In addition to the M-X, the B-1 bomber, and the Trident, air- and sea-launched cruise missiles are being developed to further improve the retaliatory capabilities of bombers, submarines, and surface ships.

## Rationale for Current Policy

There are considerations that recommend this new retaliatory strategy. Most important is the fact that the world will not end after an all-out nuclear war. People, factories, and weapons on both sides will survive any conflict. It therefore seems prudent to give some thought to the process of postwar recovery. The United States would gain nothing by using its nuclear forces to dissuade or halt aggression if, after a period of years, a still heavily damaged United States would have to capitulate to the demands of a resurgent Soviet Union or of smaller nations that might emerge as dominant nuclear powers after a major conflict between the United States and the USSR. On a more practical level, it has seemed to some that, by basing force requirements on the relative recovery of the United States and the USSR, it might be possible to estimate better "how much is enough" for strategic forces. We will never know what deters, it was said, but we might be able to calculate what will inhibit recovery for a given number of years.

These rationales for the current policy have been challenged, however. At the practical level, it has been argued that after a massive nuclear exchange the world will be so different from the one we know today that it is futile to attempt to calculate the requirements of economic or military recovery based on the technology, production methods, and organizational arrangements of today. Hundreds of thousands of separate items would be necessary to rebuild the power and influence of a modern nation, and each would have to be produced under circumstances very different from anything we can observe today. All we know for certain is that materials shortages, transportation bottlenecks, and the breakdown of customary producer-supplier arrangements would force recovering industries to adopt new production methods. The one thing that industries will not do is follow current practices.

Neither can we predict toward what goals we or the Soviets might choose to rebuild. Will housing and food take priority over rearmament? Even if we knew what path would be followed in rebuilding a nation, we have no clear idea of what constitutes "recovery." Is recovery complete when GNP reaches prewar levels, or when all "essential" industries (by someone's definition) are back in operation, or when a nation can once again pose a military threat to its

neighbors? An arbitrary definition of recovery leads to an arbitrary set of force requirements, and we are no better off than if we had chosen an arbitrary deterrent threat.

On a more profound level, it has been argued that recovery is simply not an appropriate focus for deterrent requirements. Will the leader of any country really care whether he will be ahead of or behind his opponent ten or fifteen years after a nuclear war? Even if one side emerged from nuclear war with an immediate military superiority over the other, it is impossible to predict how this advantage might be exploited in a political environment that could be radically different from anything we know today. Many argue that the uncertainties involved in nuclear war are so great that no national leader would ever base the decision to start a nuclear war on anything so tenuous as the calculation of relative recovery rates. If he does not, then what is the deterrent value of a threat to impede recovery? The population loss and physical destruction caused by any large-scale nuclear attack are likely to be so large that many have asked how deterrence will be strengthened by procuring forces to destroy those military sites or isolated factories that might survive an attack on Soviet cities.

It might be argued that nothing would be lost by adopting an anti-recovery strategy; the destruction resulting from such an attack ought to be sufficient to deter war if, indeed, anything can. But the costs of an anti-recovery strategy are great, and one might ask why they should be accepted if a smaller attack would serve as well.

Observers with different views of what might cause or deter nuclear war and what the world might be like after a nuclear war may have differing views on the wisdom of an anti-recovery strategy. Even if one accepts this element of the current strategy, though, there remains this question: Are the forces currently programmed the forces best suited to an anti-recovery strategy? For example, if we were truly concerned with retarding Soviet recovery after an attack, one of the most effective means to this end might be the use of "dirty" weapons--weapons whose radioactive debris would remain an impediment to reconstruction long after the original targets were destroyed. There has been no publicly announced policy to make U.S. weapons dirtier, and one might ask why we have not chosen to take such

measures to make Soviet recovery as difficult as we possibly can. Similarly, it might be that an attack intended to delay recovery is not best carried out all at once. Perhaps an attack launched in waves over a period of days, weeks, or even longer, would be more effective. In addition to the original industrial targets, a serial attack would destroy the essential resources that would be engaged in the reconstruction of these facilities at a later time. Current programming apparently calls for forces that are constantly on alert, ready for immediate use. Little has been said on the public record about designing forces that could be withheld for long periods and then used in a coordinated manner. If we wished to design a force capable of menacing the Soviet Union throughout the period of recovery, might we not design weapons and communications facilities that could remain dormant and without maintenance during the prolonged period between the initiation of nuclear war and their ultimate use?

These are only examples of what might be entailed by a strategy of retarding recovery. It is unlikely that many would find acceptable policies that implied using "dirty" weapons or prolonging nuclear war. The point is that without such policies, it may be difficult to develop a true anti-recovery capability, and one might question whether such a strategy pursued halfheartedly provides adequate justification for current programs.

#### An Alternative Rationale for Current Programs

Current programs might be justified on the basis of a somewhat different strategy, although the Department of Defense has not chosen to advance this strategy directly. The size and accuracy of Soviet missiles are increasing. This has led some observers to suggest that the Soviet Union is attempting to develop the capability to launch a disarming first strike against the United States. If the Soviets could destroy most of the U.S. land-based forces while expending only a portion of their ICBMs and SLBMs, a dangerous imbalance could result. We might fear that launching our SLBMs against Soviet civilian targets would provoke an attack on our cities by the remaining Soviet SLBMs. If we made no response, the remaining Soviet ICBMs could be used in a series of small strikes to extract concessions from us.

The solution to this problem is sometimes seen as a land-based force that could survive (at least partially) the initial disarming attack and then destroy most of the remaining Soviet ICBMs. At this point both nations would be reduced to dependence on their sea-based forces, and a rough parity would be reestablished. If this would be the ultimate result of a Soviet attempt at a disarming strike, it is argued, they would be deterred from ever making such an attempt.

The strategy implicit in this scenario might be called a "second-strike counterforce strategy." It postulates a U.S. deterrent force made up of two distinct parts: forces able to destroy unexpended Soviet strategic weapons and forces subsequently able to inflict severe damage on Soviet society. The forces required to implement this strategy appear to be very similar to those currently programmed for the anti-recovery strategy.

For the counterforce mission, U.S. forces must be able to attack a large number of very hard targets. Perhaps if no information were available on which silos were empty, it would be necessary to attack all Soviet missile silos and control facilities. At the same time, this force must not be perceived as having a disarming first-strike capability against Soviet ICBMs. These requirements suggest a heavy dependence on penetrating bombers. Their large payloads and high accuracy enable them to destroy many hard targets. They can be launched quickly on warning of attack. This keeps them relatively safe from a disarming strike, but their long flight times make them unlikely weapons for a first-strike disarming attack. It is, in fact, in this counterforce role that the penetrating bomber is most easily justified.

Some Soviet strategic targets might be inaccessible to bombers, and some of the bombers' weapons would be needed to suppress air defenses on the way to ultimate targets. Missiles would therefore be needed both to supplement the bombers' in the counterforce mission and to prepare the way for bombers by disrupting defenses. Mobile or submarine basing of these missiles would be desirable to protect them from an initial attack, and large yields and high accuracies would be needed to attack hard targets.

Throughout a counterforce duel, the United States would have to retain the ability to attack Soviet urban

and industrial centers to deter Soviet strikes against civilian targets. Severe losses of land-based forces must be expected in a Soviet surprise attack. Those that survive will be required for the retaliatory counterforce strike. Thus, the assured destruction mission would be almost entirely the responsibility of the SLBM force.

What emerges from these considerations is a force that includes highly capable penetrating bombers, highly accurate mobile-based ICBMs, and continued reliance on the SLBM force for an ultimate retaliation. In short, what is required is a force very much like the currently programmed force.

Some observers object to this kind of counterforce strategy on the grounds that a Soviet attempt to destroy land-based U.S. forces would be practically and politically indistinguishable from an all-out attack on U.S. industrial and population centers. There is no doubt that many weapons would be used in an attack against the U.S. strategic forces, and casualties would almost certainly be in the tens of millions. Whether we would respond to such an attack in a different way than we would to a direct attack on our population is a matter of judgment. It could be argued that the basic premise of this strategy--the distinction between counterforce war and general war--has no validity.

Other critics of this approach argue that even in the best of circumstances a large-scale counterforce strike is an extremely complex operation. To attempt such an attack with a severely degraded force and in the confusion following an attack on the United States, they continue, would only serve to disarm ourselves completely by using up our remaining forces. We would be doing nothing but finishing the job begun by the Soviets. It might be better for us to withhold our surviving land-based forces for use in a lengthy campaign to coerce the Soviet Union into ending hostilities.

Some observers have suggested that no matter what deterrent policy has been announced by the Department of Defense, it is this second-strike counterforce strategy that is behind the design of strategic forces. Even during the period when Soviet cities were the principal retaliatory targets, they note, the United States actively sought and maintained forces for a counterforce mission. Nothing

important was changed, this argument concludes, with the announcement of a new retaliatory policy. Anti-recovery targets are not really very different from the targets of the earlier strategy. The increase in counterforce capable weapons is not justified by this change in strategy; it is simply the latest manifestation of an old tendency of the Defense Department to build strategic forces to fight Soviet strategic forces.

In summary, then, it appears that current U.S. strategic force programs can be justified on the basis of either of two somewhat different policies or of some combination of the two. Questions can be raised about the wisdom and practicality of both, and it is possible to imagine different policies that require more or less costly forces. Three such alternatives are outlined in the remainder of this chapter. The basic strategy behind current policy and the forces necessary to support this policy are summarized in Table 1.

#### A POLICY OF FINITE DETERRENCE

The simplest alternative to current deterrent policy would be a return to earlier notions of an "assured destruction" retaliatory strike. The United States would stand ready to respond to a Soviet attack with a major strike against Soviet industry, population, and government. The aim of this attack would be to inflict damage on the Soviet Union sufficiently severe that no Soviet leader would be tempted to initiate nuclear war. It would be the announced policy of the United States to respond to any nuclear attack by launching this retaliatory strike, and no provision would be made for any other response.

This strategy is "finite" in the sense that a particular level of threatened destruction is deemed adequate to deter, and no forces are maintained beyond those required to achieve this level of destruction. Unlike the current policy, this strategy reflects no particular concern for the postwar balance of power or for relative rates of recovery. It is based on the assumption that no nation would choose to accept the destruction wrought by a retaliatory strike, even if it could inflict more damage on the United States or if it could emerge as the world's dominant power ten or fifteen years after a nuclear war.

TABLE 1. CURRENT POLICY

Strategy	Desired Force Characteristics	Illustrative Force
<p>Be prepared to launch a major retaliatory strike against civilian and military targets, designed to reduce the national power and influence of the Soviet Union and prevent their recovery.</p>	<p>Highly survivable forces capable of destroying large numbers of hardened targets, but not threatening surprise attack.</p>	<p>240 B-1 bombers supplementing B-52 force. Both bombers armed with cruise missiles.</p>
<p>OR</p>		
<p>Be prepared to destroy Soviet land-based strategic forces after a counterforce attack on U.S. Also be prepared to launch a subsequent strike against civilian targets.</p>	<p>ICBM force able to destroy many targets, some of which are hardened, but not large enough to threaten Soviet strategic forces.</p>	<p>200-400 M-X missiles; 350-150 Minuteman III; 450 Minuteman II; 54 Titan II.</p>
	<p>Secure force for retaliation against civilian targets.</p>	<p>Trident submarines (numbers undetermined).</p>
	<p>Forces for flexible use in either strategic or tactical situations.</p>	<p>Sea-launched cruise missiles, ICBMs, and bombers.</p>
<p>In both strategies be prepared to engage in limited nuclear operations.</p>		

The forces associated with this strategy are also "finite". There is no necessity for them to keep pace with growing Soviet forces except as is required to guarantee that an assured destruction capability will survive any enemy attempt at a disarming strike. Neither would these forces have to be of the most sophisticated types. Most of the targets attacked would be relatively soft concentrations of industrial capacity and civilian population, not hardened military facilities. Great accuracy would not in general be required. A finite retaliatory strike would seek to cause widespread destruction of the social fabric of an aggressor nation. Unlike current policy, finite deterrence does not require the destruction of particular targets. It would not, then, be necessary to maintain weapons reliable enough or potent enough to assure the destruction of every target attacked; a high percentage of successfully destroyed targets would be sufficient. Both the limited size and sophistication of the forces required suggest that this deterrent strategy will be less costly than other more demanding policies.

In practice, we might choose not to exercise this assured destruction capability in response to a small-scale attack. Instead, we might be prepared to accept some low level of damage so as not to initiate general nuclear war as a result of an accidental or unauthorized use of nuclear weapons against us. An opponent would not know what level of damage we would accept, and because no retaliation other than an all-out strike is planned for, he must always fear that any use of nuclear weapons on his part will result in the destruction of his nation.

One might choose to adopt a policy of finite deterrence if one felt that all nuclear war--even if limited at the outset--must necessarily progress to all-out war. If this is so, then there is nothing to be gained by withholding massive retaliation in favor of a more limited response. An opponent must not be tempted to initiate limited war; he must be faced squarely with the prospect that it will not remain limited. A preference for a finite deterrence strategy might be further strengthened if one viewed the growth of Soviet strategic forces as the result of Soviet perceptions (mistaken or otherwise) of U.S. strategic superiority. The unilateral reduction in U.S. forces implicit in the adoption of a finite deterrence posture would, it has been argued, allow subsequent reductions in Soviet forces.

A policy of finite deterrence implies renunciation of the limited use of nuclear weapons. This means that the United States would have to be prepared to halt any conventional aggression with purely conventional forces. Nuclear weapons could not be counted on to buttress a conventional defense. Therefore, although a finite deterrence policy would allow reduced spending on strategic forces, it would almost surely mean increased expenditures for conventional forces.

The most important characteristic of the strategic forces required to implement this strategy is that they be sufficiently invulnerable to attack to convince a Soviet leader that it is impossible to destroy enough of the retaliatory force to save his nation from destruction. Submarine-launched ballistic missiles are usually considered the most appropriate forces for the assured destruction mission because, once at sea, submarines are nearly undetectable and thus invulnerable. Current programs call for the gradual replacement of the Polaris and Poseidon submarines and missiles with the Trident SLBM system. The extended range of the Trident missiles would allow the submarines carrying them to use much larger areas of ocean, thus greatly increasing the difficulty of locating them and enhancing their chances for enduring survival. A force of 20 Trident submarines would allow 12 or 13 boats to be on station at any time, providing roughly 300 nearly invulnerable MIRVed missiles to carry out the bulk of the assured destruction mission. Because the targets to be attacked would be relatively soft (factories, transportation centers, population centers), the low yield and inherent inaccuracy of the SLBM warheads would not be severe drawbacks.

It is usually thought that some hardened targets (principally military and civilian command centers) would have to be struck in an assured destruction attack. To destroy these targets, some land-based ICBMs would be required. Retention of the 550 Minuteman III missiles now deployed in silos could provide this capability. At the same time they could provide a hedge against a technical breakthrough that could render missile-launching submarines vulnerable to attack. Since there would be few such targets, more than one warhead could be assigned to each. Present programs to upgrade the yield of Minuteman III warheads could be cancelled. There would presumably be no need for the large single warheads on the Minuteman II

and Titan II missiles, since most targets would be better attacked with multiple smaller warheads or with the more accurate warheads of the Minuteman III. Since the ICBM force would function primarily as a backup and supplement to the SLBM force, there would be no need for a major program of ICBM modernization. Specifically, it would not be necessary to continue the development of the M-X missile.

In this strategy there would be no need for the large yields and high accuracies of the weapons delivered by bombers. Bombers might still be kept in the force, however, to complicate any Soviet attempt at a disarming strike and to force the Soviets to maintain a large and expensive air defense system. For this role, the penetrating B-1 would not be required. In the near term, B-52s and FB-111s could continue to impose defensive costs on the Soviets, and when these aircraft reached the ends of their operational lives, a stand-off bomber launching cruise missiles would suffice.

Only those forces that could be on continuous alert, ready to execute a retaliatory strike, would be procured under this strategy. Thus, sea-launched strategic cruise missiles would not be included in these forces. The ships armed with these missiles would have other primary missions, and they could not be counted on always to be in a position to launch their weapons when a retaliatory strike might be called for.

A finite deterrence strategy places primary reliance on the SLBM force. It is therefore essential that communications with submarines be secure enough to transmit the order to retaliate. Because the assured destruction attack might be withheld if a very small nuclear attack were launched against the United States, this communication system must not be vulnerable to a small attack. It must be hard enough to insure that any attack capable of destroying it will be large enough and unambiguous enough to justify transmittal of the retaliatory order before communications are lost. An extremely low frequency (ELF) communication system much harder than the currently planned Seafarer system would be required. The most promising design for such a system appears to be one similar to the Sanguine ELF system proposed several years ago. Like Seafarer, the Sanguine system would require a very large buried antenna. The major difference would be that the Sanguine system would have many hardened transmitters rather than the single relatively soft one designed for Seafarer.

The main function of warning systems in this strategy would be to provide unambiguous warning of a major attack on the United States. Programmed improvements in warning systems promise to provide this capability, and no major changes in these programs would be required. Since this is a strategy of pure deterrence, there would be no need for major improvements in strategic defenses. The program to develop a follow-on interceptor could be cancelled, and the level of effort devoted to ballistic missile defense could be reduced.

Table 2 summarizes the forces required for a strategy of finite deterrence. These forces are much smaller than the forces currently planned. A policy of finite deterrence would be far less costly to implement than would be the current policy. Details of these savings are discussed in Chapter IV.

TABLE 2. A POLICY OF FINITE DETERRENCE

Strategy	Desired Force Characteristics	Illustrative Force
Be prepared to launch a major retaliatory strike against civilian targets in response to any nuclear provocation.	Secure force capable of destroying civilian targets.	20 Trident submarines.
	Multiple warhead ICBM force to supplement primary retaliatory force.	550 Minuteman IIIs.
	Bombers able to attack civilian targets not heavily defended.	B-52s or FB-111s, armed with cruise missiles and other weapons; ultimately replaced by new standoff bomber.
	Secure, hardened system for communicating with submarines.	Sanguine-type ELF system.

## A LIMITED NUCLEAR OPTIONS POLICY

All-out attacks against civilian targets and massive disarming strikes are not the only kinds of nuclear attacks that one might imagine. Strikes involving as few as one or two weapons might be employed. These small strikes could indicate resolve or demonstrate graphically what the consequences might be if an opponent did not capitulate. Somewhat larger, but still limited, attacks might be used to destroy quickly some conventional military capability that had become important in a period of intense crisis, or they might damage a few industrial targets to impress upon an entire nation the seriousness of a particular situation. Limited strikes of this sort might be launched by the Soviet Union against the United States or its allies for coercive purposes. The United States itself might conceivably desire to threaten or even to use such strikes to deter aggression against our allies or to dissuade the Soviets from what we perceive to be dangerous behavior. If our strategic forces are designed only for massive responses, a situation calling for the limited use of nuclear weapons would pose a difficult choice for the United States: inaction or total war. It is often argued that to avoid this dilemma the United States must maintain the capability to wage limited nuclear war.

Implicit in this view is the belief that a limited nuclear war could remain limited--that each side could recognize the limited nature of the other's actions and would choose to respond in a restrained manner. There has been much debate over this point, and opinions about the possibility of limited war vary greatly. Some argue that the emotional and political effects of even small nuclear strikes would force excessive retaliation. There is a high probability, they say, that the limited intentions of an attacker will be misunderstood in a political or military environment disrupted by nuclear war. If these pressures and misunderstandings would inevitably lead to general war, would it not be foolhardy to espouse a strategy of keeping war limited and thereby encourage the use of nuclear weapons? Those who hold this view would presumably favor a strategy of major retaliation only.

Proponents of a limited war strategy argue that as long as targets of value remain in both nations, there is a chance for deterrence; as long as we do not destroy all targets of value to an enemy, we continue to have some

leverage to keep him from inflicting further damage on us. At the same time, we cannot allow an enemy to launch even small attacks with impunity, and so we must be able to respond in kind. While it is true that one can never be sure that war can be kept limited, responding with an all-out attack will produce a result as bad as (even identical to) what would have happened if limitations were not observed.

Almost any large set of strategic forces will have the capability to carry out what are usually called limited nuclear options (LNOs). Certainly this capability would be provided by either the currently programmed forces or by a force designed specifically for second-strike counterforce operations. Both of these forces, however, are considerably larger and more expensive than are required for LNOs. In either force, the LNO capability is an adjunct to other requirements. If one did not accept the rationales for these larger forces, he might prefer, in addition to a finite deterrent force, a smaller force designed to provide a specific LNO capability.

Because land-based ICBMs are the most responsive and easiest to control nuclear forces, they are the most attractive weapons for LNOs. Single warhead missiles in particular are desirable, since much of the payload of a MIRVed missile would be wasted if only one target were attacked or if targets were too far apart to be attacked by separate warheads from the same missile. To carry out the LNO mission with minimum collateral damage, high accuracy and adjustable yields are also desirable. If the force of single warhead missiles were large enough so as not to be exhausted in the course of most conceivable limited exchanges, these missiles need not be mobile based. Any attack large enough to destroy all of them would probably not be considered limited.

The requirements for this missile force could be met in the near term by the 450 Minuteman II missiles currently deployed in silos. The extension of the Command Data Buffer to the Minuteman II force would allow their rapid retargeting and increase the options available to the President in time of crisis. In the longer term, a replacement for the Minuteman II missile would probably be required. The development of a new warhead and reentry vehicle to provide adjustable yield and more accuracy would require some flight testing, but since the Minuteman

II is no longer in production, this testing would most likely require the expenditure of some of the missiles now operationally deployed. Even without a test program, some minimal production would be needed to provide spares and replacements. Reopening the Minuteman II production line would be very expensive. A new single warhead missile, incorporating the advances in missile technology that have accrued since the Minuteman was introduced in 1966, would probably give greater return. This new missile would not have to be operational for some time, but initial development would have to be begun soon.

To insure that a limited war remained limited, an assured destruction force would be necessary. As in the finite deterrence force, the bulk of this capability would be provided by a force of some 20 Trident submarines. A force of multiple warhead missiles would be desirable to supplement this submarine force and to provide a hedge against any unexpected Soviet advance in anti-submarine warfare. The current force of 550 silo-based Minuteman III missiles would be adequate to meet this requirement. In this supporting role, these missiles would not need the warhead improvements now planned for them.

Penetrating bombers, particularly bombers with payloads as large as proposed for the B-1, are not the most appropriate weapons for limited strikes against the Soviet Union. Bombers can be reused after an initial attack, but this will probably not be an important advantage if the LNO missions involve only a relatively few targets; a strike that expended anything but a small fraction of U.S. nuclear forces would risk the appearance of being unlimited. The major disadvantage of using bombers to penetrate the Soviet Union is that it may be difficult for defenders to judge the intent of such a strike. A penetrating bomber could deliver a large number of weapons over a very large area, and the Soviets might fear the worst and respond accordingly. A single warhead missile, in contrast, can threaten at most one target, and any uncertainty about its destination is quickly resolved. The problem of how the Soviets would perceive a limited attack made by penetrating bombers is further complicated by the vulnerability of bombers. If a given number of bombers are to reach their targets, a larger number may have to be sent, making the attack look larger than it really is.

This is not to suggest that there is no role for bombers in an LNO strategy. It is quite possible that LNOs would be undertaken against targets outside of the Soviet Union. For these purposes, bombers might be quite effective. Because they are accurate and easy to control, they could provide the best chance of destroying only the desired targets. Because they can be launched from many locations, they provide some flexibility in defining the theater of conflict. For most LNOs outside the Soviet Union, bombers would not have to penetrate extensive air defense systems, and there would be no requirement for a bomber as sophisticated as a B-1. For the next decade, the B-52s and FB-111s now in the force will be sufficient for this role. Eventually, though, a new standoff bomber will be required.

Bombers can also serve an important function in an LNO environment by visibly threatening an enemy. Nuclear armed bombers approaching the airspace of an opponent can provide a strong show of intent while avoiding actual use of nuclear weapons. Coercive actions of this sort would not necessarily require large numbers of bombers, and the relatively small Soviet bomber force could threaten the United States in this way. If one accepted limited war as a real possibility, one would probably choose to procure a force of advanced interceptor aircraft and an improved air defense system to counter this kind of threat.

Sea-launched cruise missiles could provide a President with increased flexibility in the choice of possible targets and modes of attack. A limited war might be expected to proceed relatively slowly, with each side allowing time for its threats to have effect. In this situation, there would probably be time for the submarines (and perhaps surface ships) carrying cruise missiles to move into position to launch their missiles. The fact that these boats would not normally be positioned to launch quickly would not be a serious problem.

A secure means of communicating with submarines would be an important requirement of an LNO force, both to order the launch of cruise missiles from submarines and to guarantee that SLBMs could be launched in a massive retaliatory strike if necessary. As in the finite deterrence force, this communication could not be vulnerable to a "cheap shot." A hardened ELF system would be required for this strategy also.

If there is to be any hope of waging a limited war, the U.S. command structure must be able to know what is going on. Information about what targets are being attacked in the United States will be required if we are to observe and interpret correctly limitations on Soviet strikes. Similarly, we must be able to ascertain that our own strikes are having the desired effects. This places great importance on having secure and redundant surveillance, warning, and communication systems. Among the most important improvements in this regard would be a proliferation of mobile ground stations to receive satellite intelligence, increased defenses for satellites already in place so that they cannot be easily neutralized, and the capability to launch replacement satellites quickly if some are destroyed. Programs to upgrade warning radars could provide more accurate impact predictions for incoming warheads. This would allow a more rapid determination of what kind of attack might be underway and give the bomber force a better opportunity to escape destruction.

The forces required for an LNO policy are more extensive than those needed for a finite deterrence policy, but would still be less costly than those currently planned. Table 3 summarizes the forces required for an LNO policy. Details of the cost savings are discussed in Chapter IV.

#### A STRATEGY OF ESSENTIAL EQUIVALENCE

The principal function of nuclear forces is not to fight a nuclear war, but to deter it. Few would question this proposition, although there may be disagreement about what must be deterred and how deterrence is to be achieved. Some have argued, however, that the function of nuclear weapons is broader than this, that nuclear weapons are a highly visible symbol of a nation's power and its resolve to exercise that power. To allow an opponent to build strategic forces greatly in excess of those we have, this argument continues, is to risk giving the impression that the United States lacks the capability or the will to assert its position as a world power. Our allies may doubt that the United States will maintain its role in world affairs, and their foreign policies may gradually cease to be consonant with U.S. interests. It does not matter if our procuring additional forces would serve no strictly military function; this fact might be forgotten by other nations, by the Soviets, or perhaps even by ourselves in a time of

TABLE 3. A POLICY OF LIMITED NUCLEAR OPTIONS

Strategy	Desired Force Characteristics	Illustrative Force
<p>Be prepared to launch a major retaliatory strike against civilian targets. Also be prepared to carry on limited nuclear operations.</p>	<p>Secure force capable of destroying civilian targets.</p>	<p>20 Trident submarines.</p>
	<p>Multiple warhead ICBM force to supplement primary retaliatory force.</p>	<p>550 Minuteman III.</p>
	<p>Single warhead ICBM force principally for limited employment.</p>	<p>450 Minuteman II, ultimately replaced by improved single warhead missile.</p>
	<p>Bombers capable of destroying civilian targets or making limited strikes outside USSR.</p>	<p>B-52s and FB-111s armed with cruise missiles, ultimately replaced by new standoff bomber.</p>
	<p>Forces for flexible limited use.</p>	<p>Sea-launched cruise missiles.</p>
	<p>Secure, hardened systems for communicating with submarines.</p>	<p>Sanguine-type ELF system.</p>
	<p>Forces to prevent coercive use of Soviet bomber force.</p>	<p>Advanced interceptor aircraft and air defense system.</p>
	<p>Systems providing information on nature and progress of limited operations.</p>	<p>Improved warning, surveillance, and communication systems.</p>

crisis. If the Soviet Union is perceived to be strong and the United States weak, say proponents of this view, non-nuclear nations may be pressured into concessions to the Soviets, the Soviets may be tempted to test U.S. resolve, and we may even doubt our own strength and fail to rise to some Soviet challenge, either nuclear or conventional.

Critics of this view point out that it is impossible to draw a direct link between nuclear superiority and international influence. Nuclear power is a tremendously unwieldy tool, and in the diplomatic arena its effective use is highly problematic. What, the critics ask, do we have to show for the years when U.S. nuclear supremacy was unchallenged? In any event, a policy of matching all Soviet capabilities would be tremendously costly, and it is foolish to spend so much money only to preserve appearances.

Proponents respond that deterrence is based on nothing but appearances and that one must not dismiss too quickly the possible international effects of a long-term Soviet nuclear advantage. What is needed, say supporters of this view, is a U.S. nuclear posture that is "essentially equivalent" to Soviet nuclear forces. No one suggests that the United States should attempt to build a mirror image of Soviet forces, since our technical capabilities and our strategic situation are not exactly those of the Soviet Union. We must, however, have forces that will appear to even the most casual observer to be equal or superior to Soviet forces.

The most obvious asymmetry between U.S. and Soviet forces is the dramatically greater megatonnage that can be delivered by Soviet forces. The easiest way to increase U.S. capabilities in this regard would be by procuring a new bomber. With its large payload, a bomber, particularly one like the B-1, designed to penetrate extensive Soviet air defenses, would provide a highly visible demonstration of U.S. resolve to keep pace with Soviet force developments. It is a further advantage of a new bomber force that the Soviets are unlikely to be able to produce a matching capability in the near future.

Soviet nuclear forces are highly dependent on land-based ICBMs. In comparison to Soviet missiles, U.S. systems may appear few in number and small in size. To achieve essential equivalence with the Soviets, the United States would probably have to increase significantly the

size and capability of its ICBMs. An accelerated program for the development and deployment of a large force of M-X missiles would be necessary to accomplish this objective. An ICBM force as large as the Soviets possess would be out of the question, but an M-X force of some 600 missiles (with perhaps 200 mobile-based and 400 based in silos) replacing the Minuteman III force would be within the realm of possibility. The currently deployed Minuteman IIs and Titan IIs would be retained in the force, since they would contribute to total U.S. missile capabilities yet not be counted toward the limit of 1,320 MIRVed missile launchers imposed by the Vladivostok accords.

At present the Soviet Union maintains a force of some 880 SLBMs. The United States could not match this number with Trident missiles without exceeding the limits set for MIRVed missiles unless it gave up some of its land-based ICBMs. (All U.S. SLBMs have multiple warheads, while as yet none of the deployed Soviet SLBMs do.) A force of 30 Trident submarines would provide 720 missiles and take full advantage of the Vladivostok accords. The acquisition of this large submarine force would require the acceleration of the Trident program to the maximum possible rate--the production of two ships each year.

Another major difference between the U.S. and Soviet strategic postures is the emphasis placed on strategic defense. The Soviets maintain an extensive anti-aircraft capability and reportedly support a vigorous program of civil defense. To the extent that the United States appears to be unprepared to defend itself in a nuclear war, it has been suggested, our willingness to engage in nuclear war rather than capitulate can be questioned. Overcoming this purported weakness would require continuation of the current program to deploy a force of advanced interceptor aircraft. It would also mean a major expansion of present vestigial civil defense programs to include planning for evacuation of U.S. cities and a degree of protection for U.S. industry. Any Soviet attempt to expand ballistic missile defenses in violation of the 1972 ABM Treaty could lead to perceived imbalances in vulnerabilities. The United States would almost certainly have to respond. The current programs of research into ballistic missile defense would not support a rapid response to Soviet treaty violations in the next several years. An accelerated program of research could within four years put the United States in a position to deploy a missile defense system protecting the

present Minuteman force within a year of the decision to do so. An acceleration of these programs would also provide highly visible evidence that the United States would not allow a Soviet advantage in this area.

Few aspects of warning and surveillance programs are of high enough visibility to require expansion for purposes of maintaining a perceived balance with the Soviets. One major exception, however, would be in the area of anti-satellite capabilities. In recent years this subject has attracted much attention and will probably continue to do so. An enlarged effort for space defense would prevent the appearance of lagging U.S. capabilities in space.

Finally, the United States apparently enjoys a significant advantage over the Soviet Union in the development of cruise missiles. This advantage could be exploited by continuing current programs for both air- and sea-launched cruise missiles.

The requirements of a policy of essential equivalence are summarized in Table 4. Adoption of such a policy would add about considerably to the costs of strategic forces. Details of these extra costs are discussed in Chapter IV.

TABLE 4. A POLICY OF ESSENTIAL EQUIVALENCE

Strategy	Desired Force Characteristics	Illustrative Force
Make U.S. strategic forces unambiguously equal or superior to Soviet strategic forces.	Forces that increase megatonnage delivered by U.S. forces.	240 B-1 bombers supplementing B-52 force.
	Increased emphasis on size and capabilities of U.S. ICBM force.	600 M-X missiles; 450 Minuteman II; 54 Titan II.
	Larger SLBM force.	30 Trident submarines built on accelerated schedule.
	Forces that Soviets cannot easily duplicate.	Air- and sea-launched cruise missiles.
	Improved defensive systems.	Advanced interceptor aircraft, expanded civil defense programs, accelerated missile defense programs.

The preceding chapter has examined several alternative deterrent strategies, including the current policy, that the Congress might consider as guides for planning U.S. strategic forces. It has also identified the strategic force characteristics appropriate to support the current deterrence policy and the alternative strategies. It should be apparent that the number and kinds of strategic weapons appropriate to support each alternative strategy differ from those needed to implement the current policy. This being the case, the capabilities offered by new U.S. strategic weapons programs may or may not be needed, should the Congress prefer a different strategy. It is, therefore, useful to examine the capabilities of new U.S. strategic systems in light of their suitability for the alternative strategies. This background will make clear the implications of each policy for decisions on specific strategic weapons programs for fiscal year 1978.

The previous chapter has identified particular aircraft or missile systems as being appropriate to perform particular missions within each strategy. For example, single warhead ICBM are useful for conducting limited nuclear strikes, SLBM can be withheld to threaten the destruction of enemy civilian targets, and bombers can be used to destroy remaining enemy strategic forces. This mission capability is clearly an important consideration in planning U.S. strategic forces. Moreover, the interaction of these different strategic weapons makes a Soviet surprise attack more difficult. Their interaction is equally important and merits explanation and consideration in planning U.S. forces.

#### THE "SYNERGISM" OF THE TRIAD

As noted earlier, U.S. strategic offensive forces are composed of three elements, forming the so-called TRIAD: bombers, ICBMs, and SLBMs. Under current and foreseeable future conditions, a coordinated Soviet strike

at the land-based portion of these forces--the ICBMs and bombers--would require the use of Soviet ICBMs against U.S. ICBMs and Soviet SLBMs against U.S. bombers. Only ICBMs currently have sufficient speed, accuracy, and yield for a surprise attack against hardened targets such as other ICBMs. Only SLBMs launched on low trajectories from areas near U.S. shores have short enough flight-times to destroy bombers before they can escape from their bases.

The need to use two strategic systems to destroy U.S. land-based strategic forces creates an attack timing problem for the Soviet Union. If the Soviets wished to strike U.S. ICBMs and bombers simultaneously, they would have to launch their ICBMs first because their flight-time is longer than that of the SLBMs. That entails a risk. U.S. detection of the ICBM launch would warn of the attack, and the alert portion of the bomber force could take off before their bases were destroyed. On the other hand, if the Soviets launched their ICBMs and SLBMs simultaneously, the SLBM warheads would detonate over U.S. bomber bases before the Soviet ICBMs arrived on their targets. In this case, the Soviets would confront the risk that the United States might launch all or part of its ICBM force before it could be destroyed.

Either type of attack would leave the Soviets with a substantial risk that some portion of the U.S. land-based strategic forces would survive. Moreover, the portion of the SLBM force at sea would almost surely survive. Neither the United States nor the USSR has the advanced anti-submarine warfare (ASW) techniques required to destroy this component. Soviet attainment of such an ASW capability would be enormously difficult. It would require the capacity to search vast ocean areas, to locate U.S. ballistic missile submarines with high reliability and accuracy, and to destroy these vessels promptly on command, before they could escape or launch their missiles.

This interaction of the three U.S. strategic forces elements, often referred to as the "synergism" of the TRIAD, complicates Soviet attack calculations. It thus increases the overall effectiveness of the U.S. force as a deterrent. However, if this interaction is to work well, each component of the TRIAD must be viable. If one element of the TRIAD should for some reason come to pose no threat to the Soviet Union, it would provide little protection for

the other elements. In view of this fact, programs are now underway to modernize all three elements of the TRIAD with the B-1 bomber, the M-X ICBM, and the Trident submarine and SLBM. Cruise missiles may also be added as a fourth strategic force component. These programs are apparently intended to preserve, and perhaps increase, the diversification and mutual support of the strategic force elements, and to enhance the capability of each force component. Decisions about these programs will determine the shape of the U.S. strategic forces; they will also define the range of feasible deterrence strategies for years to come. It is, therefore, useful to review the additional capabilities offered by each new strategic weapons program and to examine their usefulness for each of the deterrence strategies discussed above. Should the Congress prefer an alternative deterrence strategy, different decisions about these weapon programs are implied.

#### BOMBER PROGRAMS: THE B-1

The B-1 is currently entering production, subject to the final approval of President Carter. It will become the mainstay of the future U.S. bomber force, complemented by the B-52s. The B-1 is designed to escape rapidly from its bases. This will counter the postulated threat of surprise destruction from Soviet low-trajectory SLBM attacks, should the Soviets ever demonstrate such a capability. <sup>1/</sup> The B-1 is also designed for very low-altitude penetration of Soviet airspace at nearly supersonic speeds. Its highly capable electronic counter-measures (ECM) equipment and its design make radar detection difficult. These characteristics are intended to frustrate future Soviet air defense developments now being projected by some U.S.

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<sup>1/</sup> Launching SLBM on depressed trajectories is not technologically difficult. However, the Soviets have simply not yet demonstrated the capability. Shortening the SLBM flight time so as to surprise the bombers at their bases would require the Soviets to deploy their ballistic missile submarines close to U.S. shores. This activity would almost surely be detected. The United States could take steps to counter the threat, such as moving the bombers to bases farther inland or conducting ASW operations against the Soviet vessels.

intelligence analysts but which have not yet appeared. These developments, including low-altitude surface-to-air missiles (SAM) and interceptor aircraft capable of destroying low-flying bombers, are expected to threaten the ability of the current B-52 force to penetrate Soviet airspace in the 1980s.

The B-1 will have a significantly greater payload than the B-52. It can be armed with mixed loads of gravity bombs, Short Range Attack Missiles (SRAM), and Air Launched Cruise Missiles (ALCM). The B-1 is said to provide a very high probability of destroying very hard and heavily defended targets. It is also said to require no additional tanker support for aerial refueling beyond the capabilities of the current KC-135 tanker fleet. However, the Strategic Air Command is presently required to provide tanker support for conventional force elements, including the Military Airlift Command and the Tactical Air Command. If tanker support for conventional force operations remains a requirement, it is not clear that the current KC-135 fleet will be adequate to support these operations and the B-1 and B-52 fleets as well.

The initial fiscal year 1978 request for B-1 program funding was \$2,154 million for eight production aircraft. However, the new Administration has since reduced this request to \$1,874 million for five production aircraft. The total program acquisition cost for the B-1 is currently estimated to be \$22.8 billion <sup>2/</sup> for 240 production aircraft and four prototypes. If the official estimates of the B-1 program costs are correct, then about 20 percent of the total program acquisition cost has already been spent. This means that, for the purposes of this Congress' decision, the remaining cost of purchasing a fleet of 240 B-1 bombers is about \$18.4 billion.

There are essentially three issues involved in the modernization of the U.S. bomber force: whether it is necessary to maintain a bomber component of the TRIAD; whether a new strategic bomber is required now; and what type of new bomber would be most appropriate. Unless the United States is willing to forego the advantage of the interaction of bombers and ICBMs as it complicates a Soviet

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<sup>2/</sup> All costs are given in current year dollars.

surprise attack and as it increases the aggregate survivability of the strategic forces, it will be desirable to maintain a U.S. bomber force. Bombers are also useful for attacking a variety of targets, either in the Soviet Union or in other countries, and their large payload somewhat offsets Soviet advantages in large ICBMs.

If it is desirable to maintain a U.S. bomber force, a new bomber will eventually be required; the nearly 20-year-old B-52 force cannot remain operationally effective indefinitely. The questions that remain, then, are how soon a new bomber would be required and what type of new bomber would be most appropriate. Answers to these questions depend partly on what types of missions the bomber force is expected to perform, and partly upon the development of Soviet threats to the bombers' ability to perform their missions.

If the bomber force is expected only to supplement other force elements in delivering a retaliatory strike against Soviet civilian targets, then the greater capability of the B-1 would not be required. This would be the case if the United States were to adopt a policy of finite deterrence or of planning for limited nuclear options. These strategies would not require bomber forces as capable as those required for the current strategy. For the near future, the B-52 force, perhaps armed with cruise missiles that could be launched at Soviet targets from outside Soviet air defenses, would be adequate for this mission. Since the B-52 force will eventually have to be retired from service, a replacement aircraft to fulfill this mission must be considered for the more distant future. One proposal has been to develop a large, wide-bodied aircraft, such as a modified Boeing 747, armed with a large number of cruise missiles that could be launched from outside Soviet air defense coverage. <sup>3/</sup> Neither the B-52 force nor a cruise missile carrier replacement would survive a surprise Soviet SLBM attack as well as the B-1. They would be slower to take off and not hardened against nuclear effects. Moreover, the Soviets could deploy low-altitude SAMs to intercept cruise missiles. Long-range interceptors could

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<sup>3/</sup> e.g., Alton Quanbeck and Archie L. Wood, Modernizing the Strategic Bomber Force: Why and How? (Washington: The Brookings Institution, 1976), pp. 34, 97.

force U.S. bombers to launch their cruise missiles farther from Soviet territory, thus potentially reducing their target coverage. Should such Soviet threats appear, they could reduce the capability of this force. However, they would probably not negate the B-52 or cruise missile carrier as a complicating factor in Soviet surprise attack calculations. Nor would improved Soviet defensive measures cancel the bombers' capability to complement SLBMs and ICBMs in destroying Soviet urban/industrial centers.

On the other hand, the capabilities of the B-1 would be needed if the United States were pursuing an anti-recovery or a second-strike counterforce strategy. In these strategies a large part of the bomber force would be required to survive a surprise attack and carry out a major attack against remaining Soviet strategic forces, and perhaps a large number of other targets as well. The B-1 would also be appropriate to a strategy of essential equivalence since its increased capabilities could offset somewhat Soviet advantages in large ICBMs and deliverable megatonnage.

Proponents of cruise missile carrier aircraft maintain that these bombers would be capable of performing the same missions as the B-1, including destruction of unlaunched Soviet ICBM, at a lower cost. However, U.S. cruise missiles currently are not expected to achieve high probabilities of destroying heavily defended targets. Further, Soviet long-range interceptor developments could reduce the ability of cruise missile carrier aircraft to cover the relevant Soviet strategic force targets. For these reasons, the B-1 would be preferred if high survivability and substantial capability to destroy very hard targets are desired.

#### ICBM PROGRAMS: THE M-X

A new missile, called M-X, is being developed as the next generation of U.S. ICBM. It would provide enhanced survivability and increased capability. The M-X is currently planned to have approximately four times greater throw-weight, significantly greater accuracy, and more numerous, higher-yield warheads than Minuteman III. These characteristics are expected to give each M-X warhead a very high probability of destroying very hard targets. The M-X is also being designed to permit deceptive mobile basing. This involves the random movement of missiles and launch

control facilities among hardened above-ground shelters or in hardened covered trenches. The ultimate deployment scheme has not yet been selected, but the trench concept appears to be the preferred candidate. Mobile basing for the M-X is expected to improve the survivability of the system significantly over fixed-based ICBMs. It would require the Soviets to attack all shelters or trench areas in which the M-X could possibly be. To conduct such an attack, the Soviets would have to expend more ICBMs than the number of M-X they would destroy. This reduces the Soviet incentive to attack the system.

The deceptive, mobile basing scheme being developed for M-X may present serious obstacles to further arms control agreements. If the system is designed to deceive the Soviets as to the exact location of each ICBM, it could also theoretically be operated to deceive them as to the number of missiles deployed. This could increase the difficulty of reaching a further agreement to limit the number of U.S. and Soviet strategic launchers. While the United States may be confident of its good faith, it may be difficult to convince the Soviets that there are no more mobile-based ICBM than we claim. Further, if the Soviets should deploy a mobile-based ICBM, the United States would want to satisfy itself that the Soviets did not use the system to violate agreed limitations. Satisfying these concerns would probably lead to prolonged arms control negotiations and the creation of complex procedures for verifying U.S. and Soviet compliance with the limitations. Even if such procedures were established, there would undoubtedly remain some possibility for cheating. These arms control difficulties and verification problems must be considered in assessing the merits of the M-X system.

The initial fiscal year 1978 request for M-X program funding was \$294 million for continued research and development, aimed toward a decision in 1978 to proceed with full-scale development of the system. This represented more than twice as much as the \$135 million projected last year for M-X funding in fiscal year 1978. Full-scale development would have permitted deployment of the system to begin in fiscal year 1984. The new Administration has subsequently reduced this request to \$134 million and has slowed the pace of the program. Initial deployment is now expected in fiscal year 1985. While the number of M-X missiles to be deployed has not yet been established, it is expected to be in the range of 200 to 400. For these numbers of mobile-

based missiles, approximate program acquisition costs might be between \$19 billion and \$28 billion.

Two issues are involved in the M-X program: whether a new, more capable ICBM is required, and whether such a new ICBM should be based in fixed silos or in a deceptive mobile deployment. A new ICBM would be needed if the U.S. deterrent policy required improved ICBM capabilities to destroy very hard targets, mobile deployment for enhanced survivability, or a U.S. ICBM development program to offset new Soviet programs. These considerations would be important to a second-strike counterforce strategy, or to ensure that U.S. forces were perceived as equivalent to Soviet forces. On the other hand, if none of these considerations plays an important role in the deterrent strategy preferred by the Congress, then the current Minuteman II and III ICBMs would probably be adequate, and the M-X would not be needed. This would be the case if the United States adopted a policy of finite deterrence or a limited nuclear options policy as a framework for strategic forces planning.

If the U.S. strategy required an ICBM with a very high probability of destroying very hard targets, such as Soviet ICBM installations, a new missile such as M-X would apparently be necessary. The current Minuteman III, even with improvements to its guidance and larger yield warheads, will not achieve a very high probability of destroying very hard targets with each warhead. Moreover, there may be technical limitations in attacking the same target with more than one warhead to increase the level of damage, and these may be difficult to overcome.

The deployment of a more capable missile might also be desirable if the United States believed that the growing Soviet ICBM threat to U.S. land-based strategic forces warranted the deployment of a more survivable, mobile-based ICBM. Minuteman III is apparently not adaptable to mobile basing without extensive and costly modifications. Air Force studies indicate that it would be almost as costly to deploy a mobile-based, modified Minuteman III as to deploy the significantly more capable mobile-based M-X. The cost of developing a new mobile missile of any type is small compared to the cost of developing and constructing the mobile basing facilities. If, in pursuing a more survivable mobile-based ICBM, the United States can have a much more capable ICBM for very little additional cost, it seems sensible to choose the more capable ICBM. Further, im-

provements in Soviet capabilities to destroy U.S. ICBMs could impel the United States to undertake an expensive mobile ICBM deployment to preserve ICBM survivability. Some would argue that, in that case, the United States' mobile-based ICBM should have an enhanced capability to threaten the Soviet ICBM force. <sup>4/</sup> The Soviets would then have to face the same concerns about ICBM survivability that they would have imposed on the United States. This could force the Soviets to bear the same burden of mobile basing to ensure the survivability of their ICBM force.

Finally, the United States may desire a new, more capable ICBM in order to parallel vigorous new Soviet ICBM developments. The deployment of M-X would probably not be as extensive as the Soviet deployments of their new SS-17, SS-18, and SS-19 ICBMs. It could not insure complete U.S.-Soviet equality in all measures of ICBM capability. The M-X program would, however, provide a significant increase in U.S. ICBM capabilities and would provide convincing evidence to the Soviet Union and other states of the undiminished strength of U.S. strategic forces.

If a new and more capable U.S. ICBM is desirable, a choice must be made about whether the system should be silo-based or mobile. <sup>5/</sup> This choice depends upon balancing the U.S. assessment of the future vulnerability of ICBM silos to Soviet attack against the cost and feasibility of mobile basing plans. The United States could choose to

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<sup>4/</sup> Donald H. Rumsfeld, Annual Defense Department Report, FY 1978, pp. 71-72.

<sup>5/</sup> The conference report accompanying H.R. 12438 (now Public Law 94-361) contains provisions, proposed by the Senate Armed Services Committee and accepted by the House conferees, "that the design of this system (M-X) should not be constrained for silo basing; that none of this program's funds shall be expended in fixed or silo basing for M-X, and that none of the program reduction shall reduce the Department's proposed investigation of mobile deployment." Authorizing Appropriations for Fiscal Year 1977 for Military Procurement, Research and Development, Active Duty, Reserve, and Civilian Personnel Strength Levels, Military Training, Student Loads, and for Other Purposes, S. Rept. 94-1004, 94-2, 1976, p. 40.

require a portion of the ICBM force to be highly survivable against a determined Soviet attack, and thus be available for use against residual Soviet strategic forces or to assist in the destruction of Soviet urban and industrial centers. If the United States believed that Soviet ICBM deployments would soon make possible the surprise destruction of the Minuteman force, and if the United States required a survivable ICBM capability, then a mobile-based M-X would be in order.

On the other hand, if U.S. strategy required a more capable ICBM to destroy Soviet hardened targets, it might choose to place the M-X in silos rather than in a mobile deployment for one of three reasons. First, the United States might conclude that a mobile ICBM deployment was politically infeasible due to the environmental objections that might be raised against construction of thousands of miles of covered trenches or against the random movement of nuclear-armed missiles above the ground. Second, the United States might decide that the deployment of a deceptive, mobile-based ICBM would pose an insuperable obstacle to further strategic arms limitation agreements. Finally, the United States might conclude that, whatever the Soviet threat to the silo-based ICBM force, the costs of mobile basing part of the ICBM force would be unacceptably high.

If any of these considerations were relevant but the United States still required a more capable ICBM with substantial counterforce capability, M-X might be placed in existing Minuteman III missile silos. This would be far less costly than mobile basing these missiles. While silo-based M-X would not provide the same high level of survivability for the ICBM force, it would afford somewhat greater surviving ICBM capability, because some of the silos surviving a Soviet attack would contain missiles with more numerous, higher yield warheads than Minuteman III.

These considerations cover the case in which a more capable ICBM is needed but where more survivable mobile basing proves impracticable. If U.S. strategy should require a missile with both substantial counterforce capability and significantly greater survivability, and if mobile-based ICBMs are precluded for the above-mentioned reasons, then Congress might wish to consider alternatives to a new ICBM, such as the Trident II SLBM. Trident II might provide the survivability and some of the capabilities of the M-X at a lower cost and with fewer environmental or arms control objections.

## SLBM PROGRAMS: TRIDENT

The Trident submarine and missile program is intended to be the successor to the current ballistic missile submarine fleet. The Trident submarine is larger than current Polaris/Poseidon vessels and carries 24 missiles. The submarine is designed for more quiet, less detectable operation than current ballistic missile submarines. It incorporates considerable growth space for more capable missiles and for possible counter-measures to hedge against Soviet ASW advances. The first five Trident submarines are currently in various stages of construction, with subsequent ships to be built at the rate of three every two years. The first Trident will begin deployment in 1979. The current Navy plan envisages eventual replacement of the current SLBM force with the Trident or a follow-on system. The first ten Trident submarines will operate from the Trident base at Bangor, Washington now under construction; a base location to serve additional submarines has not yet been determined, although a site at King's Bay, Georgia appears to be the leading candidate.

The Trident I (C-4) missile is designed to have a range of about 4,000 nautical miles with a full payload of higher yield warheads and accuracy equal to that of Poseidon. This extended range increases the ocean area available for patrol by between 10 and 20 times. It greatly complicates the Soviet ASW task and significantly enhances the future survivability of the SLBM force. The MK-500 Evader Maneuvering Re-entry Vehicle (MaRV) has been developed and demonstrated for possible deployment on the Trident C-4 missile. MaRV would provide a capability to frustrate any Soviet antiballistic missile (ABM) system deployment.

The Navy also plans to arm some of the older Poseidon submarines with Trident C-4 missiles. As U.S. ballistic missile submarines are withdrawn from the base in Rota, Spain, this Trident backfit program will enable these vessels to come within range of their targets more promptly when operating from a U.S. port and will expand the target coverage available to these vessels. It will also permit the United States to achieve a Trident deployment in the Atlantic Ocean at an early date without requiring an acceleration of Trident submarine construction, and will complicate Soviet ASW efforts in two oceans.

Also included in the Trident program is a research and development effort for the Trident II (D-5) SLBM.

This missile is intended to have significantly increased range and payload over the Trident C-4 missile, and the Navy expects each of its warheads to have sufficient accuracy and yield to offer a very good capability against hardened targets. The Navy would expect to have this missile available in the mid-to-late 1980s, depending upon Congressional action.

In fiscal year 1978 a total of \$3.5 billion is being requested to fund the Trident program. This amount includes about \$565 million attributable to the Trident C-4 backfit program and \$5 million for initial research and development of the Trident II (D-5) missile. The current Trident program is for 13 ships. The program acquisition cost for Trident over the next five years is estimated to be \$13.6 billion, including the Trident backfit program.

The requirement for the Trident is largely determined by the need to replace the aging Polaris/Poseidon fleet. Therefore, the continuance of the program is little affected by the choice among the alternative deterrent strategies discussed here. Virtually any deterrent strategy that the United States might consider is ultimately based on inflicting retaliatory damage on Soviet society. This is certainly true of all the alternative strategies considered here--finite deterrence, limited nuclear options, and essential equivalence--as well as the current policy. SLBM in general, and the TRIDENT system in particular, are well suited to deliver this retaliatory strike against Soviet cities. At the margin, the Congress might wish to slow the construction rate to one ship per year, to save money in the near term, or to accelerate the program to the maximum construction rate of two ships per year. Such an acceleration might be undertaken as a response to Soviet strategic deployments. It could also partially offset the reductions in U.S. SLBM deployments projected for the 1990s, when large numbers of Polaris and Poseidon submarines will be retired. These decisions about the pace of the program, however, do not affect the basic need for the system.

Other elements of the Trident program do appear to present some basic near-term choices for the Congress. The Trident C-4 backfit program would provide ASW hedges, expanded target coverage, and capability to hit targets soon after leaving U.S. ports. The Congress must decide whether these advantages are worth the \$2.8 billion cost. If the Congress determined that the capability offered by

the backfit program was not worth the cost, the program could be cancelled at a total savings of \$2.2 billion. Such a decision could be based upon the conclusion that a major Soviet ASW breakthrough that could threaten the Poseidon submarines is unlikely. Even if it occurred, the advance would probably not be deployable as an operational system before the Poseidon submarines reached the end of their service lives. 6/ Alternatively, if the Congress believed that the C-4's additional target coverage and their further complication of Soviet ASW problems were of value, then it would continue to approve funding for the program. It also might consider increasing the number of ships to receive the backfit.

In the case of the Trident II (D-5) SLBM, the Congress must decide whether a missile with extended range and a very high probability of destroying hardened targets should be deployed on submarines, and whether it is appropriate to begin development of this weapon this year. SLBM capabilities such as those offered by TRIDENT II would only be necessary if the United States sought to threaten the destruction of remaining Soviet strategic forces in a retaliatory strike. They could also be partially justified as contributing to the equivalence of U.S. strategic forces with those of the Soviet Union.

The development of the Trident II will for the first time offer the United States a second, highly survivable missile system, capable of destroying hardened targets, if the Navy is able to achieve the desired performance. The

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6/ Dr. John Walsh, Deputy Director for Strategic and Space Systems of the Office of the Director of Defense Research and Engineering, has testified as follows regarding a breakthrough in Soviet ASW technology: "If (an ASW) principle were just discovered, it would probably take up to 15 years before it could be fielded in an operating system of any kind. The problem is, we have no way, really, of knowing when the Soviets will discover a new principle of this sensitivity." Fiscal Year 1977 Authorization for Military Procurement, Research and Development, and Active Duty, Selected Reserve and Civilian Personnel Strengths, Hearings before the Senate Committee on Armed Services, 94-2 (1976), Part 12, p. 6613.

Congress will have to decide whether two missile systems offering these capabilities--M-X and Trident II--will be required for the future and, if not, which missile system should be developed.

The capabilities of the M-X and the Trident II, though similar, are not identical. For example, the submarine force will probably never enjoy the same degree of secure, redundant communication as the ICBM force. Thus, Trident II would probably never be as useful as M-X in delivering small-scale attacks on specifically designated hardened targets. Moreover, the use of Trident II for such limited attacks on hard targets might expose the launching submarine to Soviet detection and attack. This would compromise its survival. However, both systems would be equally appropriate for large-scale preplanned attacks on all Soviet hardened targets to destroy remaining Soviet forces. Minimal communication would probably be required to order such a strike.

It appears that the M-X ICBM will be available several years before the Trident II on the current development schedule. This would probably make the M-X the preferred weapon to enhance U.S. hard target destruction capability if this is required in the near future. However, if the M-X mobile deployment is delayed or precluded for budgetary, technical, or environmental reasons, the Trident II may emerge as an alternative system to partially fulfill the second-strike counterforce mission.

Trident II could be deployed in some or all of the Trident submarines to expand their patrol area and further complicate Soviet ASW efforts and to provide a survivable capability to destroy hard targets. Even so, the United States would probably not want this hard target mission to reduce SLBM capabilities against Soviet civilian targets. The assured capability to strike at these targets with survivable SLBMs and other surviving systems would constitute the basis of the U.S. deterrent. If Trident II were to be deployed in lieu of the M-X to threaten hardened Soviet targets, the missiles assigned to this task would have to be added to the number of SLBMs required to attack Soviet civilian targets.

#### CRUISE MISSILE PROGRAMS: ALCM AND TOMAHAWK

The United States currently has two cruise missile research and development programs underway: the Air Force's

Air Launched Cruise Missile (ALCM) and the Navy's Tomahawk sea-launched cruise missile. The ALCM is intended to serve as one form of nuclear armament for long-range strategic bombers. It utilizes an airframe that is compatible with the SRAM rotary launch rack in the B-52 and the B-1. However, this design makes the ALCM unsuitable for launch from submarines or ships, and it is not preferred for a ground-launched role. The range of the basic missile is constrained by design to about 600 or 700 miles. These relatively short ranges mean that only targets near the periphery of the USSR can be covered unless the bomber penetrates Soviet air defenses. Longer ranges could be achieved by the attachment of a supplementary external fuel tank or the enlargement of the missile, but such modifications would require carrying the missile on the wings of the B-52 and/or a change in the internal SRAM rotary launcher. The extended-range versions of ALCM apparently could not be carried on the B-1.

There are two versions of the Tomahawk missile: a shorter-range, conventionally-armed, anti-shipping missile, and a longer-range, nuclear-armed missile to attack land targets. Both versions use the same cylindrical airframe to permit launching from a torpedo tube. This design is also readily adaptable to launching from surface ships, ground platforms, or aircraft. The nuclear-armed Tomahawk is not currently planned to have a strategic nuclear role, except insofar as it would constitute an ultimate strategic nuclear reserve. Rather, it is apparently conceived as a theater nuclear weapon intended for use against targets outside the Soviet Union, such as in Eastern Europe. This mission would not require the launching ships to be continuously available to deliver nuclear strikes, and so would not impair their conventional operations.

The only strategic nuclear application for Tomahawk that is currently contemplated is the possibility of an air-launched version (Tomahawk Air Launched Cruise Missile or TALCM). Because Tomahawk is a longer-range missile than ALCM and has an airframe not designed for the SRAM rotary rack, the use of a TALCM on the B-52 would require at least a modification or replacement of the SRAM launcher and, in some plans, a shortening of the missile as well. These changes would limit the flexibility of the B-52 to carry mixed loads of gravity bombs, SRAM, and cruise missiles. While the TALCM is the only version of the Tomahawk

currently envisaged for a strategic role, it should be borne in mind that sea- or land-launched versions of this weapon could always be adapted to strategic nuclear missions if desired.

These differences in the characteristics of ALCM and Tomahawk have important arms control implications. ALCM is designed to be exclusively a strategic nuclear weapon operable only from bombers. As such, it would seem easier to negotiate a verifiable formula for limitation of its deployment. Development of a comparable formula for limiting Tomahawk deployments would require U.S. and Soviet agreement on a means of distinguishing between identical nuclear and conventionally-armed versions of the weapon, and between missiles allocated to anti-shipping, theater nuclear, and strategic nuclear missions, and of identifying the launch platforms for each type of weapon. Such a formula would be very difficult, if not impossible, to develop and at least equally difficult to verify. Moreover, it is not clear whether deployment of Tomahawk would make it more or less difficult to agree on the limitation of ALCM. This problem might be ameliorated if the Tomahawk were made either an exclusively conventional or exclusively nuclear weapon, but it is doubtful that the greater arms control problems posed by Tomahawk could be eliminated entirely. It is important that the arms control problems associated with ALCM and Tomahawk be considered in Congressional decisions on these programs.

The Department of Defense has decided to move both the ALCM and Tomahawk programs into full-scale development. Accordingly, \$234 million is being requested for continued Tomahawk research and development and \$165 million for research and development and advanced procurement of ALCM in fiscal year 1978. The program acquisition cost of the ALCM is expected to be \$2.8 billion for about 2,300 missiles. An equal number of nuclear-armed Tomahawks should cost somewhat less, since development costs would be spread over the nuclear and non-nuclear programs.

The previous chapter has identified two roles for strategic cruise missiles: as an armament for smaller and less capable bomber forces intended to supplement other TRIAD elements in destroying Soviet civilian targets; and as a supplementary sea-launched weapon for conducting limited nuclear strikes against peripheral Soviet targets. Cruise missiles to fulfill the former role would be needed

to support a policy of finite deterrence; cruise missiles to fulfill both these roles would be required for a limited nuclear options strategy or a policy of ensuring the equivalent appearances of U.S. and Soviet forces, as well as for the current policy.

The Congress must decide whether either of these cruise missile roles is appropriate to the national deterrent strategy it prefers. If one or both of these roles is deemed appropriate, the Congress has an opportunity to choose whether one or both of the current U.S. cruise missile development programs would be needed. Should the Congress now be prepared to specify the future roles desired for cruise missiles, it may be possible to proceed with only one cruise missile development program at a savings of at least \$1.5 billion over the next five years.

The choice of a single cruise missile program would imply either a reduction of future cruise missile deployment possibilities or of future bomber payload flexibility. If the national deterrent policy required a bomber force armed with cruise missiles to attack Soviet civilian targets, either the ALCM or the Tomahawk program could provide this capability. If the Congress chose to continue only the ALCM program, U.S. bombers would be able to carry mixed loads of cruise missiles, SRAMs, and gravity bombs. This would imply a willingness to do without cruise missiles launched from ships or submarines for the immediate future. However, the ability to carry mixed loads of bomber weapons may be of little value; aircraft firing cruise missiles at Soviet civilian targets would probably not penetrate Soviet airspace to drop bombs or launch SRAMs. While it would restrict future cruise missile deployment options, this choice would simplify the negotiation of cruise missile deployment limitations.

Alternatively, if the Congress elected to continue only the Tomahawk program to provide a bomber armament, the United States would also retain the possibility of deploying nuclear and conventionally armed cruise missiles on land, surface ships, and submarines. However, the selection of Tomahawk as the sole U.S. cruise missile program would probably make agreement on cruise missile limitations more difficult.

If the national deterrence policy required both a sea-launched cruise missile as a supplementary weapon for

use in limited nuclear strikes and an air-launched cruise missile, these capabilities could be provided in one of two ways. The Tomahawk program alone could provide both capabilities. This would be less costly than maintaining the two current programs, but might complicate future arms control efforts. Alternatively, both the ALCM and Tomahawk programs could be continued to provide these two capabilities. This would involve no savings over current programs, and its impact on future arms control negotiations would be uncertain.

The previous chapters have outlined the current strategic deterrent policy and several alternative strategies, with their associated forces, that the Congress might choose as a basis for decisions about new strategic weapons programs. The capabilities of the new strategic weapons have been described, their appropriateness to different deterrence policies has been examined, and some near-term issues associated with these weapons have been explored. It is now useful to summarize the decisions concerning current strategic weapons and new systems under development that would flow from choosing one of the alternative strategies outlined earlier.

Different deterrent strategies require different forces, and these different forces can have widely varying budget implications. Although the forces outlined here represent only general goals toward which forces would be built, the pursuit of any one of these goals suggests a particular pattern of spending in the near term. Our cost estimates represent savings or additional costs relative to the fiscal year 1978 budget submission of the Ford Administration. Since this budget was presented, the Carter Administration has submitted revisions to the budget that affect some of the strategic forces programs discussed in this paper. It has not been possible to use the revised budget of the Carter Administration as a basis for our cost estimates since the implications of the budget amendments for programs in future years are not yet clear. However, we have noted the impact of these changes wherever possible. These cost estimates also cover only the next five years. However, the lead time required for some programs is such that major cost differences could be expected in the years beyond 1982. Estimating these long-term differences is extremely difficult, and the rapidly changing strategic environment could easily render such estimates useless. Thus, it seems appropriate to concentrate on near-term differences, keeping in mind that these do not tell the entire story.

## A FORCE FOR FINITE DETERRENCE

If the Congress chose to adapt U.S. strategic forces to a strategy of finite deterrence, it might make the following adjustments in current strategic force programs.

- o Cancel the B-1 bomber program.
- o Cancel the M-X missile program.
- o Deny funds for the continued operation of the Minuteman II and Titan II forces.
- o Cancel the Tomahawk sea-launched cruise missile program.
- o Approve funds for a Sanguine-type ELF communication system.
- o Cancel Minuteman III warhead improvement program.
- o Cancel the follow-on interceptor program.
- o Reduce funding for the ballistic missile defense program.

At some time in the early or mid-1980s the Congress would presumably be prepared to fund development of a new standoff bomber.

The forces required for a finite deterrence strategy are much smaller and less costly than currently programmed forces. The specific changes in programs needed to adopt this strategy and the associated savings are shown in Table 5. It should be noted that large expenses for the procurement of the M-X missile and B-1 bomber would be saved in the years beyond 1982 and are not fully represented in this table.

TABLE 5. FINITE DETERRENCE STRATEGY - CHANGES FROM CURRENT PROGRAMS (BY FISCAL YEARS; MILLIONS OF CURRENT YEAR DOLLARS)

	1978	1979	1980	1981	1982
Cancel B-1 program	-2,150	-2,920	-2,960	-3,060	-2,870
Cancel M-X program	-250	-930	-1,530	-2,380	-1,960
Deactivate Minuteman II force	-140	-460	-640	-680	-720
Deactivate Titan II force	-80	-170	-170	-190	-200
Cancel Tomahawk program	-230	-310	-270	-220	-220
Begin R&D on a stand-off bomber in the mid-1980s <u>a/</u>	--	--	--	--	--
Deploy Sanguine-type ELF system	+40	+70	+230	+160	+190
Cancel Minuteman warhead improvement programs <u>b/</u>	--	--	--	--	--
Cancel follow-on Interceptor program <u>c/</u>	--	-90	-110	-830	-870
Reduce ballistic missile defense program	<u>-100</u>	<u>-110</u>	<u>-120</u>	<u>-130</u>	<u>-140</u>
Total	-2,900	-4,920	-5,570	-7,330	-6,790

a/ Since this program would not begin until the 1980s, no funds would be required over the next five years.

b/ These costs are classified; thus, the savings cannot be discussed here. However, they would be very small compared to other programs, and so would not significantly affect the totals.

c/ Funds for advanced procurement of these aircraft have been deferred for one year in the budget revisions submitted by President Carter, and the program may be cancelled by the Carter Administration.

## A FORCE FOR LIMITED NUCLEAR OPTIONS

Should the Congress choose to adopt a policy emphasizing capabilities to execute limited nuclear options if deterrence fails, the following changes in current programs would be implied:

- o Cancel the B-1 bomber program.
- o Cancel the M-X missile program.
- o Cancel Minuteman III warhead improvement program.
- o Approve funds for the development of a variable yield warhead for Minuteman II.
- o Approve funds for research and development of a new, single warhead ICBM.
- o Approve funds for a Sanguine-type ELF communication system.
- o Approve funds to accelerate the upgrading of surveillance and warning systems.

As in the finite deterrence force, funding would be needed in the 1980s for the development of a new standoff bomber.

Over the next five years, an LNO strategy would cost considerably less than would the currently programmed force. A large part of these savings, though, would result from the cancellation of the B-1 program. When procurement of a new standoff bomber and a new single warhead ICBM begin in the 1990s, some of these savings would be offset. Table 6 summarizes the changes from current programs implied by this strategy.

TABLE 6. LIMITED NUCLEAR OPTIONS STRATEGY - CHANGES FROM CURRENT PROGRAMS (BY FISCAL YEAR; MILLIONS OF CURRENT YEAR DOLLARS)

	1978	1979	1980	1981	1982
Cancel B-1 program	-2,150	-2,920	-2,960	-3,060	-2,870
Cancel M-X program	-250	-930	-1,530	-2,380	-1,960
Cancel Minuteman III warhead improvement program <u>a/</u>	--	--	--	--	--
Begin development of a new warhead for Minuteman II <u>a/</u>	--	--	--	--	--
Begin development of a new, single warhead ICBM <u>b/</u>	--	--	--	--	--
Deploy Sanguine-type ELF system	+40	+70	+230	+160	+190
Begin R&D for new standoff bomber in the mid-1980s <u>c/</u>	--	--	--	--	--
Upgrade surveillance and warning systems	+30	+40	+60	+60	+90
Total	-2,330	-3,740	-4,200	-5,220	-4,550

a/ These costs are classified; thus, the costs and savings cannot be discussed here. However, these amounts would be small compared with other programs, and so would not significantly affect the totals.

b/ Over the next five years, adequate funding for this development program would be available in the Advanced ICBM Technology budget element, which is part of the current program. Thus, no additional funds would be needed for this program in the near term.

c/ Since this program would not begin until the mid-1980s, no funds would be required over the next five years.

## A FORCE FOR ESSENTIAL EQUIVALENCE

If the Congress chose to adopt a policy of ensuring that the overall capabilities of U.S. strategic forces would not be perceived as being inferior to those of Soviet forces, it might make the following additions to current programs:

- o Approve funding for the M-X missile program to ensure deployment at the earliest possible date. 1/
- o Accelerate the Trident submarine program to procure two submarines per year.
- o Provide additional funds for civil defense--specifically for planning the evacuation of U.S. cities and the protection of U.S. industry.
- o Provide additional funds for space defense programs.
- o Provide additional funds for the ballistic missile defense program.

As M-X missiles became available to replace Minuteman IIIs, operating funds for the Minuteman III force could be cancelled.

A force designed to present an unambiguous impression of strategic parity with the Soviet Union would be quite expensive. The costs of this option are given in Table 7.

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1/ The budget revisions submitted by President Carter have reduced the requested funding for M-X and delayed its deployment for one year. Adoption of this option would require funding the M-X program at the level requested by the Ford Administration.

TABLE 7. A STRATEGY OF ESSENTIAL EQUIVALENCE - CHANGES FROM CURRENT PROGRAMS (BY FISCAL YEAR; MILLIONS OF CURRENT YEAR DOLLARS)

	1978	1979	1980	1981	1982
Deactivate Minuteman III in the 1980s <u>a/</u>	--	--	--	--	--
Accelerate Trident program	+170	+790	+230	+870	+260
Expand civil defense programs	+280	+300	+320	+340	+370
Expand space defense programs	+30	+100	+100	+100	+120
Expand ballistic missile defense program	<u>+100</u>	<u>+210</u>	<u>+230</u>	<u>+240</u>	<u>+260</u>
Total	+580	+1,400	+880	+1,550	+1,010

a/ Since this would not be done until these missiles were replaced by M-X in the 1980s, it would require no changes in the current program over the next five years.



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## CONCLUSION

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The alternative deterrent strategies outlined in this paper are not the only strategies possible, but they do represent a wide range of views on deterrence. One could, of course, construct other forces based on some combination of the concerns associated with these specific strategies. It has been the intent here to demonstrate that the choice of a particular deterrent policy does determine to a large degree what strategic forces should be procured. The reverse is also true: forces actually procured limit the kinds of policies that can be adopted. The Congress must certainly decide what forces are to be bought. To make these decisions piecemeal and without consideration of overall strategic objectives is to arrive at a deterrent policy only by accident.

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