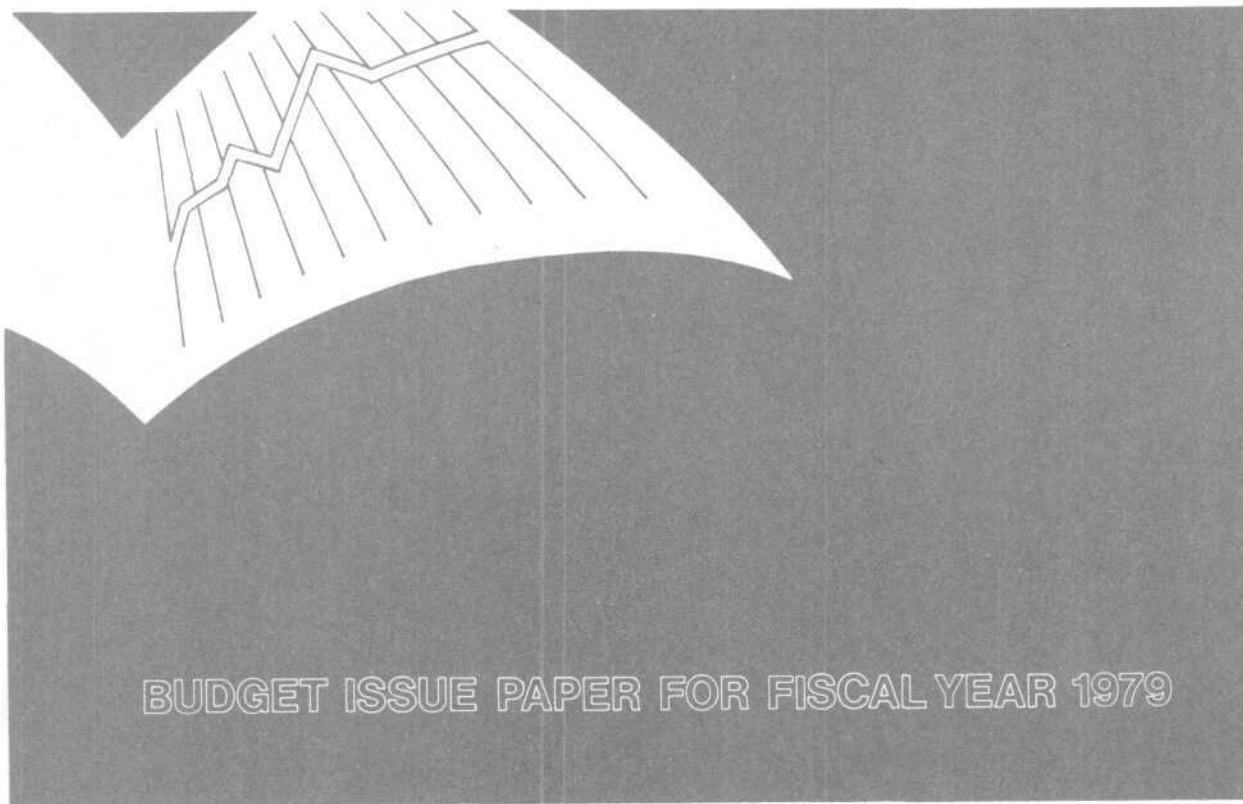


Planning U.S. Strategic Nuclear Forces for the 1980s

JUNE 1978



CONGRESSIONAL BUDGET OFFICE
CONGRESS OF THE UNITED STATES

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JUN 1978		2. REPORT TYPE		3. DATES COVERED 00-00-1978 to 00-00-1978	
4. TITLE AND SUBTITLE Planning U.S. Strategic Nuclear Forces for the 1980s				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Budget Office,Ford House Office Building, 4th Floor ,Second and D Streets, SW ,Washington,DC,20515-6925				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 70	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

**PLANNING U.S. STRATEGIC NUCLEAR
FORCES FOR THE 1980s**

**The Congress of the United States
Congressional Budget Office**

PREFACE

Two major questions will have important implications for the decisions that the Congress makes about strategic nuclear forces over the next several years. First, the growing vulnerability of the U.S. land-based Minuteman missile force has led to concerns about the future adequacy of the U.S. capability to retaliate against Soviet cities and industrial targets. New weapons might be required to maintain a sufficiently powerful and secure U.S. retaliatory capability. Second, improving Soviet capabilities to attack U.S. land-based missiles have raised the question of whether or not the United States should acquire new weapons capable of destroying Soviet land-based missiles. This budget issue paper, prepared at the request of the Senate Budget Committee, examines how different judgments about these two questions would affect decisions made about the development and procurement of several new weapon systems. Two companion papers, Counterforce Issues for the U.S. Strategic Nuclear Forces and Retaliatory Issues for the U.S. Strategic Nuclear Forces, provide supporting technical analysis.

This paper was prepared by Robert R. Soule and John B. Shewmaker of the National Security and International Affairs Division of the Congressional Budget Office, under the supervision of James R. Blaker and David S.C. Chu. The authors gratefully acknowledge the assistance of Carl R. Neu, Beth Bloomfield, Marshall Hoyler, and Nancy J. Swope. Computer programming assistance was provided by Virginia G. France. Cost estimates were provided by Edward A. Swoboda of CBO's Budget Analysis Division. Robert L. Faherty edited the manuscript. This paper's various drafts were typed by Connie S. Leonard. In accordance with CBO's mandate to provide objective analysis, the paper offers no recommendations.

Alice M. Rivlin
Director

June 1978

CONTENTS

	<u>Page</u>
PREFACE	iii
SUMMARY	ix
CHAPTER I. INTRODUCTION	1
CHAPTER II. U.S. STRATEGIC PROGRAMS AND PROJECTED SOVIET THREATS	7
Minuteman Vulnerability	7
U.S. Retaliatory Capabilities	11
U.S. Second-Strike Counterforce Capabilities	19
SALT and U.S. Strategic Force Planning	30
CHAPTER III. U.S. OPTIONS	33
Option I: Base Force of Cruise Missiles on B-52s and 20 Trident Submarines with Trident I Missiles	34
Option II: Add to the Base Force a Mobile Land-Based Missile System	37
Option III: Add to the Base Force a Prompt Counterforce Capability with MX Mobile ICBMs	42
Option IV: Add to the Base Force a Prompt Counterforce Capability with Trident II SLBMs	46
Option V: Add to the Base Force a Slow Counterforce Capability with Cruise Missiles	49

TABLES

	<u>Page</u>
TABLE 1. COSTS OF OPTION I, BASE FORCE OF CRUISE MISSILES ON B-52s AND 20 TRIDENT SUBMARINES WITH TRIDENT I MISSILES	38
TABLE 2. COSTS OF OPTION II-A, ADDING 550 MOBILE MINUTEMAN III MISSILES TO THE BASE FORCE	41
TABLE 3. COSTS OF OPTION II-B, ADDING 200 MX MISSILES TO THE BASE FORCE	43
TABLE 4. COSTS OF OPTION III, ADDING 300 MX MISSILES TO THE BASE FORCE	45
TABLE 5. COSTS OF OPTION IV, ADDING 12 EXTRA TRIDENT SUBMARINES AND 768 TRIDENT II MISSILES TO THE BASE FORCE	48
TABLE 6. COSTS OF OPTION V, ADDING CRUISE MISSILE CARRIERS TO THE BASE FORCE	51
TABLE 7. SUMMARY OF COSTS OF FIVE OPTIONS	52

SUMMARY

The Congress will be faced with decisions about several very expensive programs to augment the U.S. strategic nuclear forces over the next several years. Specifically, they will decide whether or not to develop the MX mobile intercontinental ballistic missile (ICBM), the Trident II submarine-launched ballistic missile (SLBM), and a wide-bodied cruise missile carrier aircraft. Other important issues will be the rate of procurement of Trident ballistic missile submarines and of cruise missiles.

For two decades the United States has procured strategic forces on the basis of two premises:

- o The doctrine of mutual assured destruction, and
- o The maintenance of a TRIAD of land-based ICBMs, submarine-based missiles, and long-range bombers.

Under the doctrine of mutual assured destruction, the U.S. posture has been to deter the Soviet Union from launching a nuclear attack by making clear that, even if Soviet nuclear weapons were used to attack U.S. strategic forces, the United States would have surviving forces powerful enough to inflict unacceptable damage on Soviet industrial targets. A TRIAD of three different types of forces has served to complicate Soviet efforts to develop weapons that might destroy U.S. forces before they could reach the Soviet Union. With such a three-part force structure, an unexpected vulnerability in one or two elements would not compromise the entire U.S. strategic deterrent.

Improvements in the strategic forces of the Soviet Union may, however, require a careful reexamination of these two premises. The most immediate problem is the growing ability of increasingly accurate Soviet multiple-warhead ICBMs to destroy U.S. silo-based Minuteman ICBMs. By the middle 1980s, Soviet missiles might be accurate enough--that is, accurate to within about 600 feet of their targets--to destroy more than 90 percent of the U.S. land-based missile force. The predicted vulnerability of the Minuteman missile force has led to questions about both the

future adequacy of the U.S. assured destruction capability and the desirability of maintaining a strategic TRIAD that includes land-based missiles. The growing Soviet ability to attack U.S. ICBMs has also raised the question of whether or not the United States should acquire a matching counterforce capability--that is, a special kind of retaliatory capability that could be used to destroy Soviet ICBM silos.

ARE MORE WEAPONS NEEDED FOR THE ASSURED DESTRUCTION MISSION?

The United States already has underway two major programs that respond to projected improvements in Soviet forces. Trident submarines armed with Trident I ballistic missiles and bomber-launched long-range cruise missiles are expected to begin entering the force in the early 1980s. These weapons will complicate Soviet antisubmarine warfare and air defense efforts.

The United States will have a fleet of 20 Trident submarines with 480 Trident I missiles by the early 1990s if the present building rate of three submarines every two years is continued. 1/ A force of 20 Trident submarines and 300 B-52 bombers armed with about 3,000 long-range cruise missiles and a smaller number of gravity bombs and short-range attack missiles (SRAMs) could destroy about three-quarters of both the Soviet industrial target base 2/ and the general purpose military facilities 3/ in the Soviet Union--even after absorbing a Soviet surprise attack. Moreover, this force would provide some insurance that the U.S. ability to destroy the industrial targets in

1/ The existing Trident shipbuilding yard is having trouble sustaining a building rate of three submarines every two years. If this problem continues, the Congress may want to investigate the feasibility of opening a second yard.

2/ The Soviet "industrial target base" does not include all of the industrial capacity in the Soviet Union. Instead, it is an estimate of the Soviet industrial targets that the United States would want to destroy in a major retaliatory strike.

3/ "General purpose military facilities" are defined in this paper to include all types of military targets other than ICBM silos and their launch control facilities.

the Soviet Union would not be compromised by an unexpected Soviet development threatening to U.S. forces; specifically, this force could destroy three-quarters of the Soviet industrial target base even if either the submarines or the bombers became vulnerable. And U.S. forces could inflict a similar amount of destruction on Soviet industry even if the Soviets took time to implement civil defense measures designed to protect industrial machinery from nuclear blast--largely because U.S. detection of these measures would alert U.S. forces and result in the survival of thousands of additional weapons.

Uncertainty will always exist, however, about the ability of U.S. bombers and cruise missiles to penetrate Soviet air defenses. And no one can rule out the remote possibility of a Soviet technological breakthrough that would threaten the submarine force. If the Congress wishes to have a third force for retaliation against the Soviet Union, then a more survivable system of MX mobile missiles or modified mobile Minuteman III missiles could be developed and deployed in a basing system in which missiles would move at random among several aboveground shelters or within underground trenches. Such a survivable land-based missile force would provide a capability to destroy three-quarters of the Soviet industrial target base even if both the U.S. submarine and bomber forces became vulnerable; such a force could also destroy three-quarters of both the industrial and general purpose military targets in the Soviet Union if either the submarines or the bombers became vulnerable.

SHOULD THE UNITED STATES ACQUIRE A COUNTERFORCE CAPABILITY?

In some future crisis, Soviet leaders might decide to use a fraction of their large multiple-warhead ICBMs to launch an attack that could destroy the U.S. Minuteman force but would avoid the destruction of U.S. cities. Perhaps 5 million Americans would be killed by such a counterforce attack. But most Americans would remain alive as long as the Soviets refrained from launching direct attacks on U.S. cities. Thus, as long as U.S. cities remained intact, American leaders would have a powerful incentive to avoid direct attacks on Soviet cities. If attacks on Soviet cities were the only response available to the President, the U.S. retaliatory threat might not be credible and Soviet leaders might gamble that the United States could be coerced by an attack on the Minuteman force. Thus, to enhance the credibility of its nuclear deterrent, the United States might want forces capable of destroying Soviet ICBM silos in a second strike. An ability

to destroy the Soviet ICBMs held in reserve after an attack on U.S. forces could also prevent the Soviet Union from gaining a relative advantage in strategic capabilities surviving a missile exchange. MX mobile ICBMs, Trident II SLBMs, and additional long-range cruise missiles might provide such a counterforce capability.

Opponents of new U.S. weapons capable of destroying Soviet ICBM silos argue that no rational Soviet leadership would risk an attack on U.S. land-based missiles that would kill millions of Americans and leave the United States with more than enough weapons to destroy the Soviet Union as a modern industrial society. Moreover, they point out that, even without the procurement of additional weapons capable of destroying Soviet ICBM silos, the United States would have many ways to respond to a Soviet first strike against U.S. land-based missiles without resorting to attacks on Soviet cities. Possible options for limited nuclear response include attacks on Soviet general purpose military facilities and on Soviet economic assets that are isolated from populated areas.

Opponents of a U.S. counterforce capability also argue that weapons threatening to Soviet ICBMs could actually increase the chance of war. Soviet leaders facing a serious international crisis would know that a U.S. first strike could destroy their own land-based missiles--the most important part of the Soviet nuclear arsenal; thus, they might be tempted to launch a preemptive attack before the United States could destroy their vulnerable missiles. A U.S. counterforce capability that could itself be destroyed by a preemptive Soviet first strike would present an especially great temptation to a Soviet leadership facing a real prospect of war. For example, threatening MX ICBMs based in vulnerable Minuteman silos could present especially inviting targets for a Soviet first strike.

U.S. weapons deployed in survivable basing systems would be less likely to tempt the Soviets to launch a preemptive attack, because survivable U.S. weapons could not be destroyed in a Soviet preemptive first strike. Trident II SLBMs based in Trident submarines or a large number of MX mobile ICBMs deployed in a trench or shelter system extensive enough to absorb a large-scale Soviet ICBM attack could provide a survivable U.S. counterforce capability. These missiles would provide a "prompt" counterforce capability--that is, one that could be used to destroy Soviet ICBMs within minutes of a decision to launch an attack.

Cruise missiles provide the unique advantage of being so slow to reach their targets that they would not pose a first-strike threat to the Soviet ICBM force. They could, however, be used in a U.S. second-strike counterforce attack. Long-range cruise missiles based in bombers kept on ground alert would also be survivable. Thus, deployment of additional cruise missiles on wide-bodied jets would probably not provide the Soviet Union with an incentive to strike first in a crisis.

SALT CONSIDERATIONS

The proposed SALT II agreement will not prevent the Soviets from developing a capability to destroy a large fraction of the U.S. Minuteman ICBM force. Under the terms of the SALT II treaty, the Soviets would have more than enough multiple-warhead ICBMs to target two warheads on each U.S. ICBM silo, and attempts to restrain improvements in the accuracy of Soviet missiles are not likely to be effective. It would, of course, be in the interests of both sides to agree to limit mutually weapon systems threatening to land-based missiles. Effective restrictions on counterforce capabilities would, however, require an arms control agreement that goes beyond the current efforts to limit future increases and improvements in strategic weapons; instead, such an agreement would have to require actual reductions in forces. Limiting the Soviet threat to the U.S. Minuteman force, for example, would require the dismantling of most of the large multiple-warhead missiles that the Soviet Union currently deploys.

In designing a posture for the strategic forces, the Congress will want to consider the ways in which the provisions of proposed SALT agreements affect U.S. force options. For example, if the Congress wishes to adopt a counterforce policy, then a SALT agreement that allows development and deployment of MX ICBMs, Trident II SLBMs, or long-range cruise missiles launched from wide-bodied aircraft should be pursued. The SALT II Protocol which would last through September 1980 could ban all of these weapon systems if it were extended into the 1980s. Specifically, the Protocol may include bans on "new" ICBMs and "new" SLBMs--categories that would include MX ICBMs and Trident II SLBMs, and it may limit the range of cruise missiles and ban deployment of these weapons on wide-bodied jets.

The SALT II agreement now under negotiation may also ban mobile missiles through 1980. If such a ban were extended into the 1980s, the United States could be prevented from deploying

mobile ICBMs. A SALT agreement that establishes procedures for counting the number of mobile missiles deployed by both the United States and the Soviet Union--possibly including on-site inspection procedures--should be sought if the Congress wishes to deploy a more survivable mobile land-based missile system.

The size--and thus the cost--of the mobile missile basing system needed to insure that a large number of U.S. mobile ICBMs could survive a large-scale Soviet missile attack will depend critically on the number and size of ICBM warheads that the Soviet Union deploys. For this reason, SALT limits on the Soviet ICBM force would be very important if the Congress wishes to deploy a mobile missile system.

U.S. OPTIONS

Option I: Base Force of Cruise Missiles on B-52s and 20 Trident Submarines with Trident I Missiles

The Congress may judge that an ability to destroy three-quarters of the Soviet industrial target base and a similar fraction of Soviet general purpose military facilities should be enough to deter the Soviet Union from attacking the United States. In this view, an additional capability to destroy Soviet ICBM silos would be unnecessary and could even increase Soviet incentives to strike first in a crisis.

Trident submarines with Trident I missiles and B-52 bombers armed with long-range cruise missiles, gravity bombs, and short-range attack missiles seem particularly well-suited for retaliation against Soviet industrial and military targets other than ICBM silos. Continued procurement of three Trident submarines every two years, of Trident I SLBMs, and of cruise missiles for half of the B-52 bomber force would cost about \$26 billion through the year 2000. ^{4/} Operating the submarine and bomber forces--as well as the existing Minuteman and Titan ICBMs--would cost about \$94 billion, making a total cost of \$120 billion for this option. This option serves as a base force against which the costs of additional weapons can be measured.

^{4/} All costs presented in this summary are in constant fiscal year 1979 dollars.

Option II: Add to the Base Force a Mobile Land-Based Missile System

The Congress may feel that a force heavily reliant on the second-strike capabilities of submarines and bombers would not provide enough insurance against unexpected technological breakthroughs by the Soviet Union. Development and deployment of a mobile land-based missile system would increase the insurance maintained in the strategic forces. Even if the Soviet Union made simultaneous technological breakthroughs in the areas of anti-submarine warfare and air defense, the U.S. ability to destroy three-quarters of the Soviet industrial target base would not be compromised.

The United States could deploy either modified Minuteman III missiles or new MX ICBMs in long underground trenches or in fields of multiple shelters. In either case, thousands of miles of trench or thousands of shelters would have to be constructed in order to insure that a large fraction of the mobile Minuteman or MX missiles could survive a Soviet first strike directed against the trench or shelter basing system.

Deployment of mobile Minuteman III missiles might be preferred over deployment of MX ICBMs by those who believe that the United States should avoid acquiring a counterforce capability. It would be virtually impossible to deploy a force of MX ICBMs large enough to provide a significant second-strike retaliatory capability yet small enough to avoid posing a counterforce threat to the Soviet silo-based ICBM force.

Modifying 550 Minuteman III missiles and constructing 8,600 shelters would cost about \$26 billion. Operating this force would cost about \$8 billion through fiscal year 2000. Adding these costs to the cost of the base force gives a total cost for this option of \$151 billion.

Procuring a force of 200 MX missiles and 5,800 shelters would cost about \$23 billion. Operating this force would cost about \$5.3 billion. The total cost for this option is \$147 billion.

Option III: Add to the Base Force a Prompt Counterforce Capability with MX ICBMs

A counterforce posture would appeal to those who believe that a U.S. President could never order an all-out retaliatory strike

against Soviet cities as long as U.S. cities remained intact and that the Soviet Union might not be deterred from launching a limited nuclear attack unless the United States could counter-attack against Soviet ICBMs. Land-based MX mobile ICBMs would be particularly effective in the counterforce role because of their great accuracy and their secure, two-way communications.

Procuring a force of 300 MX missiles and 8,500 shelters would cost about \$30 billion. Operating this force would cost about \$7.6 billion through fiscal year 2000, making a total cost of \$156 billion for this option.

Option IV: Add to the Base Force a Prompt Counterforce Capability with Trident II SLBMs

The United States could acquire a submarine-based counterforce capability by building a force of 32 Trident submarines and by developing and deploying the Trident II SLBM. This counterforce option would appeal to those who do not want to provide additional strategic targets in the United States for the Soviets to attack with their ICBMs. A U.S. counterforce capability that was not vulnerable to a Soviet ICBM attack might reduce Soviet incentives to strike first in a crisis, and it might reduce the American casualties that would result from a counterforce exchange.

Acquiring of a sea-based counterforce capability would require efforts to enhance communications with submarines and to improve the accuracy of submarine-based missiles. Accelerating the rate of Trident construction to three submarines a year by the early 1980s would also be required; a second Trident shipbuilding yard would probably be needed for this purpose.

Procurement of 12 extra Trident submarines and 768 Trident II missiles for the entire 32-boat force would cost about \$28 billion. Operating 12 extra Trident submarines would cost about \$4.2 billion through fiscal year 2000, making a total of \$153 billion for this option.

Option V: Add to the Base Force a Slow Counterforce Capability with Cruise Missiles

Very accurate cruise missiles could provide a capability to destroy Soviet ICBM silos in a U.S. second-strike counterforce

attack. Because of their slow speed, however, they would not pose a first-strike threat to the Soviet ICBM force. Deployment of additional long-range cruise missiles would thus appeal to those who want a counterforce capability but believe that Soviet incentives to strike first in a crisis might be increased if the United States had a counterforce capability that could be used in a U.S. first strike.

This option would require that close attention be paid to the range of cruise missiles and to their possible vulnerability to improved Soviet air defense systems.

Procuring 4,800 additional long-range cruise missiles--for a total of 7,800--and 75 wide-bodied cruise missile carrier aircraft would cost about \$10 billion. Operating the cruise missile carriers would cost about \$5.5 billion through fiscal year 2000, making a total cost of \$136 billion.

The following table summarizes the costs of the five options.

SUMMARY OF COSTS OF FIVE OPTIONS: BY FISCAL YEARS, IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979-1983	1979-2000
Base Force (Option I)	38,120	120,400
Additions to Base Force		
Add Mobile Minuteman III (Option II-A)	3,750	30,600
Add 200 MX (Option II-B)	4,340	27,000
Add 300 MX (Option III)	5,510	35,200
Add Trident II (Option IV)	6,990	32,200
Add Cruise Missile Carriers (Option V)	870	15,600

CHAPTER I. INTRODUCTION

Over the next several years, the Congress will be making decisions about several expensive programs to augment the U.S. strategic nuclear forces. At issue will be the development of the MX mobile intercontinental ballistic missile (ICBM), the Trident II submarine-launched ballistic missile (SLBM), and a wide-bodied cruise missile carrier aircraft. The rate of procurement of Trident ballistic missile submarines and cruise missiles will also be important issues.

During the last two decades, the United States has procured strategic forces on the basis of two premises:

- o The doctrine of mutual assured destruction, and
- o The maintenance of a TRIAD of three kinds of strategic weapons: land-based ICBMs, submarine-based missiles, and long-range bombers.

Improvements in the strategic forces of the Soviet Union will, however, require a careful reexamination of these two premises as the Congress makes decisions about the development and deployment of a new generation of U.S. strategic weapons.

Under the doctrine of mutual assured destruction, the U.S. posture has been to deter the Soviet Union from launching a nuclear attack by making clear that, even if Soviet nuclear weapons were used to attack U.S. strategic forces, the United States would have surviving forces powerful enough to inflict unacceptable damage on Soviet cities and industrial targets. Reliance on such a retaliatory threat has been based on a belief that physical defense against a nuclear attack by the Soviet Union would be impractical and prohibitively expensive.

To be an effective deterrent, the U.S. capability to carry out a retaliatory strike against the Soviet Union should be able to survive a Soviet surprise first-strike attack designed to destroy U.S. strategic forces before they could strike the Soviet Union. If U.S. forces could not survive such a Soviet attack--often referred to as a "counterforce" attack--a Soviet leadership fearing that war was imminent might be tempted to launch a preemptive first strike against U.S. forces.

In order to minimize the possibility that the Soviet Union could launch a successful disarming first-strike counterforce attack, the United States maintains diverse and redundant strategic nuclear forces. Diverse and redundant forces hedge against unexpected technological developments by the Soviet Union. For example, even if the Soviets developed a system that could detect and destroy missile-carrying submarines, other forces--long-range bombers, for instance--would insure that the United States could retaliate effectively against the Soviet Union. Diverse forces also prevent the Soviet Union from concentrating its military resources on any one offensive or defensive system designed to counter U.S. weapons.

Since the 1960s, the United States has maintained a three-part system, or TRIAD, of strategic forces including land-based Minuteman ICBMs, Polaris and Poseidon submarine-launched ballistic missiles, and long-range B-52 bombers. Today, these forces provide a powerful assured destruction capability. Together, they could destroy at least 80 percent of the Soviet industrial target base 1/ and more than 90 percent of the general purpose military targets 2/ in the Soviet Union--even after absorbing a massive Soviet surprise first strike while U.S. forces were in a normal, peacetime alert status. 3/ Moreover, individually, each part of

-
- 1/ The Soviet "industrial target base" does not include all of the industrial capacity in the Soviet Union. Instead, it is an estimate of the Soviet industrial targets that the United States would want to destroy in a major retaliatory strike.
- 2/ "General purpose military targets" are defined in this paper to include Soviet army, air force, and naval installations, as well as theater nuclear weapons and all nuclear weapon storage sites--in other words, all types of military targets other than ICBM silos and their launch control facilities.
- 3/ The nuclear exchange simulations performed by the Congressional Budget Office did not account for certain operational constraints on U.S. strategic forces that could make their actual performance moderately less effective than that indicated by the computer model used to derive these results. These constraints and other assumptions made in CBO computations are discussed in Congressional Budget Office, Retaliatory Issues for the U.S. Strategic Nuclear Forces, Background Paper (June 1978). That paper contains a detailed examination of both the weapons requirements for retaliation

the existing TRIAD is capable of destroying about three-quarters of the industrial targets in the Soviet Union. Thus, these forces provide a "well-hedged" assured destruction capability in the sense that unexpected Soviet threats to one or two elements of the TRIAD would not compromise the U.S. ability to damage seriously the Soviet industrial target base.

In the future, however, the Soviet Union may develop strategic capabilities that threaten the ability of U.S. strategic forces to survive a first-strike attack. The most immediate problem is the growing capability of increasingly accurate Soviet ICBMs armed with Multiple Independently Targetable Reentry Vehicles (MIRVs) to destroy U.S. silo-based Minuteman ICBMs. The growing vulnerability of U.S. land-based missiles will force the United States to rethink both its basic strategic doctrine and the desirability of maintaining a TRIAD of strategic forces that includes land-based missiles.

One element of the TRIAD will be threatened by the projected Soviet capability to destroy silo-based Minuteman ICBMs. This development has led to concern about the future adequacy of the U.S. assured destruction capability. Without a survivable land-based missile force, the United States would become more dependent on the retaliatory capabilities of submarine-based missiles and long-range bombers. Under these circumstances, improvements in Soviet air defenses against low-flying aircraft or the possibility of a Soviet technological breakthrough in antisubmarine warfare would become more serious causes for concern. The possibility that the Soviet civil defense program could reduce the damage inflicted by the U.S. nuclear weapons that survived a Soviet attack and evaded Soviet defenses has also led to doubts about the future effectiveness of the U.S. retaliatory capability.

For these reasons, the Congress may wish to develop and deploy a more survivable mobile ICBM system. It is anticipated that a force of 200 to 300 MX missiles, which would move at random among several thousand protective shelters or within thousands of

against Soviet industrial and general purpose military targets and the effects that the Soviet civil defense program might have on this retaliatory capability. The vulnerability of U.S. strategic forces to a Soviet counterforce attack is examined in Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces, Background Paper (January 1978).

miles of underground trenches, would be less vulnerable to a Soviet missile attack than the existing force of 1,000 stationary silo-based Minuteman ICBMs. Such a survivable land-based missile force might enhance the U.S. assured destruction capability by maintaining the high degree of insurance against Soviet threats to U.S. strategic forces provided by a TRIAD of three survivable parts.

The future viability of the doctrine of mutual assured destruction has also been called into question by the growing Soviet ability to destroy U.S. ICBMs in a first strike. In the case of a Soviet counterforce strike against U.S. ICBMs and other strategic forces that avoided direct attacks on American cities, a U.S. threat to retaliate against Soviet cities might not be a credible deterrent because American leaders would be reluctant to strike Soviet cities as long as U.S. cities remained intact and the Soviet Union maintained forces that could destroy them in retaliation. Many observers have suggested that a U.S. ability to destroy Soviet ICBM silos might provide a more credible retaliatory threat. An ability to destroy the Soviet ICBMs held in reserve after an attack on U.S. strategic forces might also prevent the Soviet Union from gaining an advantage in surviving strategic capabilities remaining to each side after a counterforce exchange. This concern about possible limited nuclear-strike scenarios raises the question of whether or not the United States should develop and deploy more powerful and more accurate strategic weapons capable of destroying Soviet silo-based ICBMs in a U.S. second-strike counterforce attack. MX mobile ICBMs, Trident II SLBMs, and additional bomber-launched long-range cruise missiles could provide such a second-strike counterforce capability. 4/

The MX missile could begin deployment by fiscal year 1986 if full-scale development is begun this year. This missile would be more accurate and capable of delivering many more warheads than the most advanced Minuteman III missiles. Deployed in large enough numbers, it could thus provide an improved capability to destroy well-protected Soviet ICBM silos.

4/ The arguments for and against the acquisition of a U.S. counterforce capability are discussed in Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces.

The Trident II missile, a submarine-launched ballistic missile that could be carried in the large missile tubes of Trident submarines, could begin initial development in fiscal year 1979 and be available for deployment in the mid-to-late 1980s. The Trident II SLBM could improve the accuracy and increase the destructive power of the warheads delivered by submarine-based missiles; thus, it might provide a means to acquire a sea-based capability to destroy Soviet ICBM silos.

The rate of Trident submarine construction now and in the early 1980s will determine the number of submarines that will be in the force by the late 1980s and early 1990s. Trident submarines are now being authorized at a rate of three every two years, a pace that will result in a force of about 20 submarines--with 480 missiles--by the early 1990s, when the existing 10 Polaris and 31 Poseidon submarines will all have been retired from the fleet. If the Congress wishes to acquire a sea-based capability to destroy Soviet ICBM silos--in addition to a sea-based capability to destroy industrial targets in the Soviet Union--a larger submarine force would be required. Acquiring such a capability by the early 1990s would require acceleration of the pace of construction to three submarines a year by the early 1980s.

The Administration has also requested funds to begin development of a wide-bodied transport jet to be used as an aircraft for carrying cruise missiles. Eventual procurement of wide-bodied cruise missile carriers and acceleration of the rate of cruise missile procurement could provide enough additional bomber-launched weapons to target Soviet ICBM silos in a second strike.

Given the length of time required to develop and deploy new weapons, decisions made in the near future about these programs will be important because they will not have a major impact on the capabilities of U.S. strategic forces until the 1980s and 1990s, when various threats to the U.S. nuclear deterrent are predicted to become serious. For example, it takes about six years to build a Trident submarine, so that a policy of increasing submarine-based strategic capabilities would require that the Trident building rate be accelerated by the early 1980s in order to have any effect on force levels by the 1990s. And it could take from six to eight years to develop a new MX mobile ICBM. Thus, the Congress will have to make decisions in the near future about the proper way to respond to problems that are projected for the 1980s.

At issue are major decisions not only about weapon systems but also about the position the United States should take in the second round of Strategic Arms Limitations Talks (SALT II) and in future arms control negotiations. The Congress will want to insure the compatibility of decisions about U.S. strategic weapons and the U.S. SALT negotiating position. Of particular importance will be the Protocol that may accompany the proposed SALT II treaty. The Protocol would last through September 1980, while the treaty itself would remain in effect through 1985. The Protocol may temporarily ban or limit weapons such as mobile ICBMs, new ballistic missiles, and cruise missiles. If restraints on these weapons were incorporated into a SALT III agreement and extended into the next decade, they could affect the options that will be available to the United States in the 1980s.

Chapter II of this paper examines the future ability of those U.S. strategic forces that would be expected to survive a Soviet first strike to destroy Soviet industrial and general purpose military targets. It also looks at the arguments for and against a shift to a U.S. retaliatory doctrine that places greater emphasis on counterforce strikes against Soviet ICBMs.

Chapter III presents five different sets of strategic forces that would be consistent with different judgments about both the adequacy of the U.S. assured destruction capability and the desirability of adopting a counterforce strategy.

CHAPTER II. U.S. STRATEGIC PROGRAMS AND PROJECTED SOVIET THREATS

MINUTEMAN VULNERABILITY

Both of the primary justifications for new U.S. strategic forces--that the U.S. retaliatory capability may be compromised in the future and that the United States may need to acquire weapons capable of carrying out a second-strike counterforce attack--stem in large part from the growing ability of Soviet missiles to attack and destroy the U.S. force of fixed, land-based Minuteman and Titan ICBMs.

The Threat to the Minuteman Force

The Soviets continue to deploy a new generation of increasingly accurate ICBMs armed with Multiple Independently Targetable Reentry Vehicles (MIRVs)--SS-17, SS-18, and SS-19 missiles--that are each capable of striking several U.S. silo-based ICBMs. With a large force of MIRVed, or "multiple-warhead," ICBMs, the Soviets could potentially assign two very powerful warheads to each of the 1,000 Minuteman and 54 Titan missile silos while using only a fraction of their own ICBMs in an attack. For example, using only 250 SS-18 missiles in a counterforce attack, the Soviets could be expected to destroy about 55 to 60 percent of the Minuteman force in an attack that targeted two warheads on each U.S. missile silo--assuming that the Soviets achieve missile accuracy to within about 1,200 feet (0.2 nautical mile) of their targets by the early 1980s. ^{1/} Damage in this range would not compromise the U.S. land-based retaliatory capability, however,

^{1/} The effectiveness of such a Soviet attack would depend upon whether the fratricide phenomenon--that is, the destruction of attacking warheads that entered an area where previous nuclear detonations had recently taken place--would limit to one or two the number of Soviet warheads that could be exploded in the area of each Minuteman silo. No one will ever really know how the fratricide phenomenon would affect a large-scale missile attack. See Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces, Background Paper (January 1978), pp. 11-15.

because the 400 Minuteman missiles that would remain could destroy about three-quarters of the Soviet industrial target base. 2/

By the middle 1980s, however, the threat to the Minuteman force could become more serious. The Soviet Union now has a new generation of ICBMs under development, and flight testing of one or two of these four new missiles could apparently begin in the near future. 3/ These missiles could be introduced by the middle 1980s--about the same time as the U.S. MX mobile ICBM could be initially deployed. 4/ If these new missiles can achieve accuracies to within about 600 feet (0.1 nautical mile), or if the accuracy of existing missiles could be upgraded by the incorporation of improved guidance systems, 5/ then more than 90 percent of the Minuteman force might be destroyed by a Soviet counterforce attack that targeted two warheads on each U.S. missile silo. 6/

2/ This assumes that the 400 Minuteman missiles that survived a Soviet first strike could be optimally retargeted and that 80 percent of the missiles would function reliably.

3/ Department of Defense, Annual Report, Fiscal Year 1979, p. 50.

4/ Fiscal Year 1978 Authorization for Military Procurement, Research and Development, and Active Duty, Selected Reserve, and Civilian Personnel Strengths, Hearings before the Senate Committee on Armed Services, 95:1 (April 1977), Part 10, p. 6860.

5/ The Soviets have reportedly flight-tested a fourth model of their SS-18 missile--called the SS-18 Mod 4--with an improved guidance system. Some reports have indicated that these tests have approached accuracies of 600 feet. See "SALT II in Sight?" Air Force Magazine (May 1978), p. 20; and Clarence A. Robinson, Jr., "Soviets Boost ICBM Accuracy," Aviation Week and Space Technology (April 3, 1978), p. 14.

6/ Moreover, in this case, the fratricide phenomenon would become a much less important source of uncertainty about the actual outcome of an attack because, with missiles accurate to 600 feet, even an attack that relied on the explosion of only one warhead in the area of each Minuteman silo could result in very high levels of damage. The attacker would

Even with more accurate missiles, a Soviet leadership contemplating a large-scale missile attack would still face great risks and uncertainties. Given possible variations in the reliability, warhead yield, and accuracy of weapon systems, 7/ there would be a chance that only 75 percent of the U.S. ICBM force would be destroyed--leaving 250 Minuteman missiles surviving, rather than the expected 100. 8/ If 250 Minuteman missiles did survive, they could destroy about half of the Soviet industrial target base. 9/ Moreover, the Soviets could never be sure that the United States would not launch some or all of its ICBMs before the arrival of the attacking Soviet missiles. All these uncertainties would probably cause Soviet leaders to think twice about launching an attack on the U.S. ICBM force. Despite all these uncertainties, however, there is little doubt that silo-based missiles will become increasingly vulnerable as

still fire two warheads at each ICBM silo, but the second one would be needed only if the first failed to function reliably. See Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces, p. 21.

- 7/ In the annual report of the Department of Defense for fiscal year 1976, Secretary of Defense James R. Schlesinger discussed one source of uncertainty about operational missile accuracy:

Meanwhile, we in the United States must accept the fact that while our test-range accuracies with all-inertial guidance systems have shown marked improvement over the years, there remain considerable uncertainties about the extent to which accuracies will degrade on operational trajectories, especially since the world is not a perfect sphere. (Department of Defense, Annual Report, Fiscal Year 1976 and Fiscal Year 1977, p. II-8.)

Weather conditions in the area of the target can also affect missile accuracy.

- 8/ See Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces, p. 21.
- 9/ This assumes that the 250 Minuteman missiles that survived could be optimally retargeted and that 80 percent of the missiles would function reliably.

missile accuracies are improved in the future. That situation may be unacceptable to those U.S. leaders who wish to have a high degree of confidence that the U.S. retaliatory capability could not be compromised by unexpected Soviet threats. It may also be unacceptable to those leaders who believe that the Soviet Union might be tempted to use its counterforce capability to launch a limited nuclear attack. These concerns might call for the deployment of a more survivable land-based missile system or for the acquisition of a U.S. counterforce capability.

Could SALT Prevent Minuteman Vulnerability?

It would, of course, be in the interests of both sides to agree to limit mutually weapon systems threatening to land-based missiles. For many years, silo-based ICBMs have provided an inexpensive and survivable deterrent force. Alternatives, such as mobile ICBMs, will be much more expensive to build and to operate. Mobile missiles could also complicate efforts to verify SALT limits on the number of weapons that may be deployed.

It does not seem likely, however, that the proposed SALT II treaty will prevent the Soviets from developing a capability to destroy the vast majority of the U.S. Minuteman force in a first-strike counterforce attack. The Soviet Union has already deployed many large multiple-warhead ICBMs. And the numerical limits on multiple-warhead ICBMs and large ICBMs imposed by the SALT II treaty will not prevent the Soviet Union from deploying enough ICBM warheads to target two weapons on each U.S. Minuteman missile silo. With large deployments of Soviet multiple-warhead ICBMs permitted, efforts to restrict Soviet counterforce capabilities would probably have to concentrate on measures to prevent further improvements in missile accuracy.

Qualitative limits of this sort would probably be difficult to negotiate and verify, however. Even strict limits on ICBM flight tests, for example, might not prevent improvements in accuracy, because new guidance systems might be tested on other missiles. ^{10/} And a ban on the testing and deployment of "new"

^{10/} For a discussion of this problem, see Hearings on H.R. 8390 (Supplemental Authorization for Appropriations for Fiscal Year 1978), Hearings before the House Committee on Armed Services, 95:1 (July, August, September, and November 1977), pp. 150, 156.

ICBMs--a provision that may be included in the temporary SALT II Protocol--might be ineffective in limiting accuracy improvements, because improved guidance systems and computer programming might be incorporated into existing missiles. Thus, defining and verifying a ban on "new" missiles that would prevent the Soviets from improving the accuracy of their existing missiles, and thereby from acquiring a threatening counterforce capability, would be a difficult task. ^{11/} Effective restrictions on counterforce capabilities would thus require an arms control agreement that goes beyond the current efforts to limit future increases in the quantity and improvements in the quality of strategic weapons; instead, it would have to require actual reductions in forces. Limiting the Soviet threat to the U.S. Minuteman force, for example, would require the dismantling of most of the large multiple-warhead missiles that the Soviet Union currently deploys.

U.S. RETALIATORY CAPABILITIES

The growing Soviet ability to destroy a large fraction of the Minuteman ICBM force has led to concern that the U.S. retaliatory capability could be inadequate in the future. Specifically, without a survivable land-based missile force, the United States will have only two secure basing systems for its strategic forces: long-range bombers and submarines. Under these circumstances, Soviet advances in antisubmarine warfare and in air defense against low-flying U.S. bombers and cruise missiles could compromise the U.S. retaliatory capability. Soviet civil defense measures might further reduce the damage that could be inflicted in a retaliatory strike by U.S. forces that survived a Soviet first strike and penetrated Soviet defenses.

For these reasons, there could be a need to strengthen U.S. retaliatory forces by procuring a larger number of more survivable, more destructive weapons in order to insure that the Soviet Union could under no circumstances escape a devastating U.S. retaliatory strike. For example, survivable mobile ICBMs would provide increased confidence that the U.S. ability to

^{11/} For a discussion of this problem, see statement on SALT by Walter Slocombe, Director, DoD SALT Task Force, printed in Congressional Record (April 4, 1978), p. S4764. SALT restrictions on flight testing and on "new" missiles could, however, reduce the confidence that the Soviets would have in the accuracy of their missiles.

inflict sufficient retaliation on the Soviet Union would not be compromised by Soviet technological breakthroughs in antisubmarine warfare and air defense.

The Retaliatory Capabilities of U.S. Trident I SLBMs and Cruise Missiles

The possible need for new U.S. weapons such as MX mobile ICBMs can be examined by looking at the retaliatory capabilities of a baseline force of Trident submarines with Trident I missiles and B-52 bombers armed with cruise missiles. Trident submarines are now being produced to replace the aging fleet of 41 Polaris and Poseidon submarines. As mentioned above, with a continued building rate of three Trident submarines every two years, the United States will have a force of about 20 Trident boats--with 480 Trident I missiles and 3,840 warheads--by the early 1990s, 12/ when all the Polaris and Poseidon submarines will have been retired from the fleet. 13/ The U.S. bomber force will remain

12/ A smaller number of Trident submarines would provide about as much peacetime retaliatory capability as a larger force of Polaris and Poseidon submarines for three reasons. First, Trident submarines will carry 24 missiles--compared with 16 for Polaris and Poseidon boats. Second, 66 percent of the Trident submarines will be at sea at any given time--as opposed to 55 percent of the Polaris and Poseidon fleet. Third, Trident I missiles will carry more destructive warheads than older Poseidon missiles. A smaller Trident force could not, however, provide as much retaliatory capability as the existing Polaris and Poseidon fleet during periods of international tension when more than three-quarters of U.S. submarines would be at sea.

13/ The Trident program has experienced serious delays, which have led to a concern that the current building rate of three submarines every two years cannot be sustained. For example, if problems at the existing shipbuilding yard continue, 20 Trident submarines may not be in the fleet until 1996. The last Poseidon boats will reach the end of their planned 25-year life in 1993. To have a force of 20 Trident submarines by the early 1990s, the United States might have to accelerate the Trident construction rate to two submarines a year in the early 1980s if the current construction delays continue. This could require a second shipbuilding yard.

at its current level of about 300 B-52s and 60 FB-111s. About half of the B-52s are scheduled to be armed with some 3,000 long-range cruise missiles in the early 1980s. The rest of the B-52s and the FB-111s will continue to carry bombs and supersonic short-range attack missiles (SRAMs). The existing 1,000 Minuteman and 54 Titan ICBMs could remain in the force, although the Congress may want to consider retiring these missiles as they become increasingly vulnerable. 14/

A force of 20 Trident submarines, 300 B-52s, and 60 FB-111s will continue to provide the United States with a substantial retaliatory capability through the 1990s. Together, the submarine and bomber forces could destroy at least three-quarters 15/ of both the Soviet industrial target base and the general purpose military facilities in the Soviet Union 16/--even after absorbing a massive Soviet first strike while U.S. forces were in their

14/ This base force represents continuation of strategic programs that have already entered the procurement stage. The Navy has not, however, announced its goal for the number of Trident submarines that should ultimately be procured. The Congress could choose to deploy more or fewer Trident submarines than the 20 boats contained in the CBO base force.

15/ These percentages allow for up to 40 percent growth in the number of U.S. weapons that are required because of Soviet industrial expansion through the 1990s. This is a conservative assumption. If Soviet industrial expansion resulted from the growth of existing plants or the construction of new plants near existing ones, the requirement for additional U.S. weapons would be smaller than the rate of Soviet expansion. The results presented above also assume that half of Soviet industry could withstand blast pressures of 30 pounds per square inch. This is also a conservative assumption that allows for the possibility that the Soviets have taken some permanent civil defense measures designed to protect their industrial machinery from damage resulting from the collapse of the buildings in which that machinery is housed. See Congressional Budget Office, Retaliatory Issues for the U.S. Strategic Nuclear Forces, Background Paper (June 1978), pp. 51-52.

16/ Ibid., pp. 16-19.

normal, peacetime alert status with 30 percent of the bombers on ground alert and 66 percent of the Trident submarines at sea. 17/

Individually, the U.S. submarine and bomber forces would continue to provide a hedged capability to devastate Soviet industry. Even if the submarine-based missile force were neutralized by either a Soviet antisubmarine warfare system or an antiballistic missile system, the bomber force could destroy three-quarters of the Soviet industrial target base. 18/ If all the U.S. bombers and cruise missiles were shot down by an advanced Soviet air defense system against low-flying aircraft, the Trident submarine force could still destroy about three-quarters of the Soviet industrial target base. 19/

The United States has ongoing programs to modernize the submarine and bomber forces that should decrease the probability that the Soviets could develop effective antisubmarine warfare, antiballistic missile, or air defense systems--events that are currently considered to be highly unlikely. Trident submarines will be quieter than the Polaris and Poseidon submarines they will replace, thus making Soviet efforts to detect U.S. submarines through acoustic measures more difficult than

17/ This is a conservative assumption that allows for the possibility that the Soviets might launch a surprise attack with no warning and without a prior buildup of international tensions. If there were warning, many more U.S. weapons would be expected to survive the Soviet attack.

18/ This assumes that the Soviet antisubmarine warfare system or the antiballistic missile system would take time to deploy, allowing the United States time to retarget optimally its bomber force against Soviet industrial targets. It is also assumed that 80 percent of the U.S. bombers and cruise missiles could penetrate Soviet air defenses and that 100 short-range attack missiles would be used to destroy Soviet air defense facilities.

19/ This assumes that there would be time to retarget optimally the submarine-based missile force and that 80 percent of the U.S. Trident I missiles would function reliably.

they already are. 20/ In addition, the 4,000 nautical mile range of the Trident I missile will greatly expand the ocean area available for submarine patrol, thus complicating Soviet antisubmarine warfare efforts even further. 21/ The United States has also developed a maneuvering warhead, or MaRV, for the Trident I missile--called the MK-500 Evader--that would complicate the task of developing an effective antiballistic missile system.

Long-range air-launched cruise missiles are scheduled to be deployed with part of the B-52 bomber force in the early 1980s. These weapons seem likely to enhance the capability of bomber-delivered weapons to penetrate improved Soviet air defenses. Because of their long range, cruise missiles could be launched before the bombers carrying them could be attacked by present Soviet air defenses. And because the cruise missile flies very low and is difficult to detect by radar--and could be made even harder to detect in the future--Soviet efforts to intercept these weapons should be extremely difficult. Moreover, because cruise missiles are relatively inexpensive, the United States can deploy enough missiles to saturate Soviet air defense systems.

The Effects of Soviet Civil Defense

The Soviet civil defense program also seems unlikely to compromise the U.S. ability to devastate the Soviet Union in a retaliatory strike. The current program consists of a major effort to protect the Soviet leadership in substantial shelters, a lesser effort to protect key workers in less effective shelters, and an evacuation scheme for the bulk of the urban population. In addition, the Soviets are apparently concerned with protecting their industry through dispersal of plants, bomb-resistant construction, sandbagging of critical machinery in a crisis, and fire protection.

Those measures could provide a certain amount of protection for industrial machinery. And they--especially urban evacuation

20/ On the other hand, the larger size of Trident submarines might make them potentially more susceptible to non-acoustic detection measures.

21/ The United States also has a continuing program--called the SSBN Security Program--designed to anticipate potential submarine vulnerabilities before they occur.

plans--could save lives because blast, heat, and intense radiation would prove fatal to most people in the immediate vicinity of an explosion. On the other hand, extensive Soviet civil defense measures--including population evacuation and the placement of sandbags around industrial machinery--would take time and would almost certainly be detected by the United States. Warning of an impending attack would allow the United States enough time to put about three-quarters of its submarines to sea and more than 80 percent of its bombers on alert--many more than the surprise-attack planning scenario in which only U.S. forces on alert under normal, peacetime conditions are assumed to survive a Soviet first strike. An increased alert posture for U.S. forces would result in the survival of thousands of additional weapons that could inflict as much damage on Soviet industry as would be expected to occur in the absence of any civil defense measures. 22/

Trident I missiles will also carry more destructive warheads than the older Poseidon missiles they will replace. This would help overcome Soviet civil defense measures that might be effective in protecting critical industrial machinery from the blast pressures created by relatively small Poseidon missile warheads.

Are More Weapons Needed for Retaliation?

Barring unexpected Soviet threats, a force of 20 Trident submarines armed with Trident I missiles and 300 B-52s armed with

22/ Soviet civil defense measures--especially urban evacuation--might be effective in decreasing the number of Soviet fatalities that would be expected to result from a U.S. retaliatory strike. If the number of fatalities is judged to be an important measure of U.S. deterrent power, then the availability of a reserve force for delayed attacks would be very important. Delayed attacks could kill people after they had regrouped and begun recovery efforts. To be useful, a reserve force should be survivable for months. Submarine-based missiles would thus be the logical candidate for a reserve force. Surveillance systems capable of identifying targets should also be survivable, and a means of communicating the target location to the forces must be available. Command and control systems--perhaps based in submarines--should also be survivable for a reserve force to be most effective. See Congressional Budget Office, Retaliatory Issues for the U.S. Strategic Nuclear Forces, pp. 22-28.

long-range cruise missiles, bombs, and supersonic short-range attack missiles seems likely to provide the United States with a powerful retaliatory capability into the 1990s. A force that is heavily reliant on submarines and bombers would, however, be less diverse and redundant than today's TRIAD of three survivable parts. Specifically, without a survivable land-based missile force, the United States would have two--rather than three--systems capable of retaliating against the Soviet Union after having absorbed a Soviet first strike. U.S. strategic forces would thus provide less insurance against unexpected Soviet threats in two senses. First, U.S. forces could not destroy most of the Soviet industrial target base if the Soviet Union made simultaneous technological breakthroughs in antisubmarine warfare and in air defense against low-flying bombers and cruise missiles. Second, a force heavily reliant on submarines and bombers would no longer provide a capability to destroy large percentages of both the Soviet industrial target base and the general purpose military facilities in the Soviet Union if either the submarines or the bombers were neutralized by some unexpected Soviet threat.

Deployment of more survivable mobile ICBMs, such as MX missiles or modified Minuteman III missiles based in long underground trenches or fields of multiple shelters, would be one response to the growing Soviet ability to attack fixed, silo-based Minuteman missiles and the resulting U.S. dependence on the second-strike capabilities of submarines and bombers. If a mobile basing system large enough to survive a Soviet ICBM attack were constructed, then the United States would maintain a capability to destroy most of the Soviet industrial target base even if the submarine and bomber forces became unexpectedly and simultaneously vulnerable. Mobile ICBMs would also improve the U.S. capability to destroy large percentages of both Soviet industrial targets and general purpose military facilities if either the submarine force or the bomber force became vulnerable.

It could be very expensive to build a survivable land-based mobile missile system, however. In general, any land-based missile system presents targets for the other side's missiles. Mobile ICBMs based in long underground trenches or in fields of multiple shelters would gain their survivability from having more locations--or "aim points"--in which to hide than the Soviet ICBM force could destroy. Because the Soviets would never know exactly where the U.S. mobile missiles were at any one time, they would have to destroy all of the U.S. trenches or shelters in order to

be sure that all the missiles were destroyed. 23/ As long as the United States had more miles of trench or more shelters than the Soviets could destroy, some mobile missiles would survive a Soviet preemptive attack against them.

But, depending on how many large ICBMs the Soviets ultimately deploy, a mobile missile system could require many thousands of miles of trench or thousands of shelters in order to insure that a high percentage of the mobile missiles could survive a large-scale Soviet ICBM attack. For example, if the United States were to modify the existing 550 three-warhead Minuteman III missiles for mobile deployment, it would want a trench or shelter system large enough to enable 60 percent of the missiles to survive a Soviet ICBM attack. This would provide a second-strike retaliatory force of about 1,000 warheads, enough to destroy about three-quarters of the Soviet industrial target base. If the Soviet multiple-warhead ICBM force were constrained by a SALT II agreement to a level of 820, then about 5,000 miles of trench basing or 8,600 shelters would be required to insure that 60 percent of the mobile Minuteman missiles could survive a Soviet ICBM attack. 24/ If the SALT negotiations broke down and the Soviets deployed large multiple-warhead ICBMs in all 1,400 of

23/ U.S. mobile missiles would be less vulnerable to a Soviet missile attack than existing silo-based ICBMs only if the Soviets could not tell in which shelter or in what part of the underground trench system the U.S. mobile missiles were located. If the Soviet Union developed a detection system that could locate the U.S. mobile missiles, then a mobile ICBM system would be more vulnerable than today's force of well-protected Minuteman ICBMs. Foiling Soviet efforts to locate the U.S. mobile missiles could potentially require decoy systems. Shelter basing systems, in which missiles would be moved aboveground from one shelter to another, would be more likely to require decoys than underground trench systems. Because decoys could present extremely difficult SALT verification problems, trenches might, on these grounds, be the preferred basing system.

24/ The miles of trench or the number of shelters required assume that the Soviets would use only their multiple-warhead ICBMs in an attack and that they would assign two warheads to each of the remaining 450 Minuteman II missile silos and the 54 Titan II missile silos. These figures also assume that

their existing missile silos, about 8,000 miles of trench or 14,000 shelters could be required to insure that 60 percent of the Minuteman missiles could survive a Soviet first strike.

A small MX force of 200 missiles with 10 warheads each would provide more warheads than a force of 550 Minuteman III missiles--that is, 2,000 warheads as compared with 1,650. Because the number of warheads in the arsenal before an attack would be larger with the MX force than with the Minuteman III force, the percentage of MX missiles that would have to survive a Soviet ICBM attack in order to insure that 1,000 warheads would be available for retaliation would be smaller--in fact, 50 percent of the MX force compared with 60 percent of the Minuteman III force. Thus, a mobile MX missile system would require fewer miles of trench or fewer shelters than an equally effective mobile Minuteman force. ^{25/} The basing system would still be very large, however. Under a SALT II agreement, about 3,600 miles of trench or 5,800 shelters would be required. Without a SALT agreement, almost 6,000 miles of trench or 10,000 shelters could be required.

In either case, building a large mobile missile system would be expensive; it is possible that the Soviets could deploy more silo-based ICBMs at less cost than the United States would have to spend to expand its mobile missile basing system. For this reason, numerical SALT limits on the number and size of Soviet ICBMs would be important in guaranteeing that a survivable mobile missile system could be built at reasonable cost.

U.S. SECOND-STRIKE COUNTERFORCE CAPABILITIES

Even a powerful and secure U.S. capability to carry out a retaliatory strike against Soviet cities and industry might not

Soviet ICBMs would be 80 percent reliable and accurate to 600 feet by the latter half of the 1980s and that the U.S. trenches and shelters would be resistant to 600 pounds per square inch of overpressure.

^{25/} A force of MX mobile ICBMs would also require fewer miles of trench or fewer shelters than a force of mobile Minuteman III missiles because, with U.S. deployment of MX missiles, the Soviets would have to assign warheads to the Minuteman III missiles that would remain in their existing fixed silos.

be enough to deter a limited Soviet nuclear attack. The Soviet Union possesses enough weapons to launch a first strike against U.S. military targets while holding a reserve force capable of destroying U.S. cities in a subsequent attack if the United States launched a retaliatory strike on Soviet cities. Thus, in the event of a Soviet first strike that avoided direct attacks on U.S. cities, the United States would have a powerful incentive to refrain from retaliating against Soviet cities. For this reason, the U.S. threat to carry out a retaliatory strike against Soviet cities might not be a credible deterrent in many conceivable nuclear-exchange scenarios.

More specifically, there is growing concern that, at some point in the future, the Soviet Union could use a fraction of its increasingly accurate multiple-warhead ICBMs to attack and destroy the vast majority of the U.S. Minuteman missile force while the United States would not have weapons capable of counterattacking against the Soviet ICBMs held in reserve. Perhaps 5 million Americans would be killed by such a counterforce attack. ^{26/} But, as long as U.S. cities remained intact, the great majority of Americans would remain alive, thus providing a powerful incentive for U.S. leaders to avoid direct attacks on Soviet cities. In such a limited nuclear war scenario, U.S. retaliation against Soviet cities might be considered an inappropriate--and incredible--response. Thus, such a U.S. threat might fail to deter a limited Soviet attack. Despite the great risks and uncertainties involved in initiating a nuclear war, a Soviet leadership facing desperate circumstances might gamble that the United States--if it lacked an ability to counterattack against the Soviet ICBMs held in reserve--could be coerced by an attack, or the threat of an attack, on the Minuteman force.

^{26/} The number of Americans that would be killed by a Soviet counterforce attack is uncertain; reasonable estimates range from 1 million to 15 million fatalities. Several uncertainties account for the large range. These uncertainties include: the U.S. military targets that would be attacked; the point of explosion of the Soviet warheads, whether in the air or on the ground (the latter would produce much more radioactive fallout); the yield of Soviet warheads; the amount of shelter protection provided for the U.S. population; and the U.S. wind pattern. See Bruce Bennett, Fatality Uncertainties in Limited Nuclear War, R-2218-AF (Santa Monica, California: The Rand Corporation, November 1977).

In recent years, this "counterforce scenario" has been a particularly troubling concern to the Department of Defense. In fact, in his annual report for fiscal year 1976, then Secretary of Defense James Schlesinger went so far as to say that to "threaten to blow up all of an opponent's cities, short of an attack on our cities, is hardly an acceptable strategy, and in most circumstances the credibility of the threat would be close to zero, especially against a nation which could retaliate against our cities in kind." 27/

Secretary of Defense Harold Brown has expressed similar concern in his annual report for fiscal year 1979:

Assured destruction cannot be the only response available to the President. We are quite uncertain as to how an adversary with increasingly sophisticated strategic nuclear forces might consider employing them in the event of a deep and desperate crisis. But we know that a number of possibilities would be open to him. As a consequence, we must have the flexibility to respond at a level appropriate to the type and scale of his attack.

As part of that flexibility, we must be able to launch controlled counterattacks against a wide range of targets--including theater nuclear and conventional forces, lines of communication, war-supporting industry, and targets of increasing hardness: from aircraft runways and nuclear storage sites to command bunkers and ICBM silos. It should be added that a great many of these facilities--including airfields and ICBM silos--could remain priority targets for a second-strike. 28/

Of course, even without the development and deployment of more accurate and more powerful strategic forces, the United States has many retaliatory options short of direct attacks on Soviet cities and industry. For example, existing forces provide

27/ Department of Defense, Annual Report, Fiscal Year 1976 and Fiscal Year 1977, p. II-3.

28/ Department of Defense, Annual Report, Fiscal Year 1979, p. 55.

a capability to destroy virtually all of the general purpose military facilities in the Soviet Union--in addition to three-quarters of the Soviet industrial target base.

New weapons would be required, however, if the United States wanted to acquire a second-strike capability to attack and destroy well-protected Soviet ICBM silos--where the Soviets have the vast majority of their strategic capability. Existing Minuteman III missiles do not have a sufficient combination of accuracy and warhead power to destroy Soviet missile silos with greater than 40 to 60 percent probability, ^{29/} and, in the future, Minuteman silos will be vulnerable to a Soviet first strike. Both existing Poseidon submarine-launched ballistic missiles and future Trident I SLBMs will be too inaccurate and will carry warheads too small to be effective against ICBM silos. Bombs and cruise missiles carried on B-52s would provide a capability to destroy Soviet missile silos, but the B-52 force would not carry enough weapons to target both Soviet industry and Soviet ICBMs in a second strike.

Many analysts believe that a second-strike counterforce capability would enhance deterrence and reduce Soviet incentives to strike first in a crisis by insuring that the United States would have a credible and appropriate response to any Soviet attack. In this view, U.S. deterrent power is strengthened by providing the President with as many options as possible for responding to an attack.

Many analysts argue that Soviet leaders might be tempted to launch a counterforce attack against the United States if they believed that such an attack would leave the United States with surviving strategic forces inferior to those held in reserve by the Soviet Union. A U.S. capability to destroy the Soviet ICBMs held in reserve after a first strike against U.S. forces could be used to reestablish a balance of strategic capabilities between each side after a counterforce exchange. Thus, the Soviets could not gain an advantage from an attack on U.S. strategic forces, and the ability of U.S. forces to deter a Soviet counterforce attack might therefore be enhanced. A capability to respond in kind to a Soviet counterforce attack on the U.S. Minuteman force--or on other U.S. strategic forces--might also be a desirable deterrent

^{29/} See Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces, p. 34.

if one believed that U.S. counterattacks on the same kinds of targets in the Soviet Union as were attacked in the United States would make it less likely that a nuclear war would escalate out of control.

In addition to broadening the range of U.S. limited nuclear response options, the acquisition of a U.S. counterforce capability might have other beneficial effects. Given the projected Soviet threat to U.S. silo-based ICBMs, many analysts believe that it would be desirable to develop a counter-threat to the Soviet ICBM force in the hope that this would compel the Soviets to stop deployment of relatively cheap and very threatening silo-based missiles. A threat to Soviet silo-based ICBMs might force the Soviet Union to shift to more survivable--and more expensive--missile basing systems such as submarines and mobile land-based systems. U.S. counterforce weapons would thus require the Soviets to spend more of their limited military resources on survivability--which is not threatening to the United States--and less on powerful silo-based ICBMs--which are threatening.

Forcing the Soviet Union to develop and construct a mobile basing system for its ICBMs could contribute to the survivability of a U.S. mobile land-based missile system. The survivability of U.S. mobile missiles based in underground trenches or fields of multiple shelters could be threatened if the Soviets had enough powerful silo-based ICBMs to launch an attack against all the U.S. trenches or shelters. If forced to deploy mobile ICBMs of their own, the Soviets might have a smaller number of less powerful missiles than they otherwise would.

Ultimately, proponents of a U.S. counterforce capability hope that long-term stability would result from a U.S. threat to the Soviet ICBM force. If both sides were forced to deploy mobile ICBMs, a stable situation might be established, similar to that which existed during the era of silo-based single-warhead ICBMs, when neither side had an ability to attack the other's land-based missiles. Moreover, the survivability of each side's mobile missiles would be relatively insensitive to further improvements in missile accuracy. As mentioned above, mobile systems would gain their survivability from the existence of more trenches or shelters than the Soviets could destroy, rather than from the protection of hardened silos which can be destroyed by the blast and shock effects created by nearby nuclear explosions. Thus, technological advances in the field of missile guidance would not jeopardize U.S. security or strategic stability.

Matching growing Soviet counterforce capabilities might also be important for political reasons. U.S. policy for the strategic nuclear forces may affect the perception by other nations of the relative military power and national will of the United States and the Soviet Union. Appearances may influence the disposition of other countries to rely on U.S. security guarantees and to remain closely aligned with the United States. And appearances may affect the willingness of adversaries to test American resolve. For example, a U.S. counterforce capability might enhance the credibility of the U.S. threat to use nuclear weapons in defense of NATO allies. Thus, even if counterforce capabilities seem militarily unusable to many, the Congress may wish to develop and deploy weapons capable of attacking Soviet ICBM silos in order to enhance the appearance of U.S. power.

Because there are some 1,400 ICBM silos in the Soviet Union, and because these targets are designed to resist the great blast pressures created by nearby nuclear explosions, acquisition of a U.S. capability to destroy Soviet missile silos in a second strike would require the development and procurement of more powerful and more accurate weapons. These weapons should be able to survive a Soviet first strike against them and deliver with great accuracy a large number of powerful nuclear warheads. A second-strike counterforce capability could be acquired by deployment of MX mobile ICBMs, Trident II submarine-launched ballistic missiles, or large numbers of additional bomber-launched, long-range cruise missiles.

The most obvious objection to the acquisition of U.S. counterforce capabilities is cost. In addition, several other objections have been raised. First, many find the limited nuclear strike counterforce scenario to be unrealistic. These observers question the utility to the Soviets of a counterforce strike that would leave the United States with the ability to carry out a devastating retaliatory strike against Soviet cities. Certainly, U.S. leaders behaving rationally would have an incentive to refrain from launching an all-out attack on Soviet cities as long as they knew that U.S. cities remained intact. But Soviet leaders could never be sure how the United States would respond to a large-scale nuclear attack on the U.S. land-based missile force that killed millions of Americans and disrupted U.S. communications and command and control arrangements.

Second, even without the acquisition of weapons capable of destroying Soviet ICBM silos, the United States already has many options for nuclear response short of direct attacks on Soviet

cities. In fact, there are many Soviet strategic targets other than ICBM silos that the United States could attack. These include Soviet submarine ports, bomber bases, and command and control facilities. U.S. attack submarines and patrol aircraft could also destroy Soviet missile-carrying submarines that are at sea; in this way, the United States could use its superior antisubmarine warfare capabilities to offset a possible future Soviet advantage in ICBM counterforce capabilities. Other targets might include Soviet army and air force units deployed to the border with China; critical links in transportation systems, such as locks and bridges; important isolated economic targets, such as dams, oil fields, and oil refineries; and some major defense industries.

Finally, many analysts object to the acquisition of a U.S. capability to destroy Soviet ICBMs on the grounds that such a capability would actually increase the chance of nuclear war. From the Soviet perspective, U.S. deployment of MX or Trident II ballistic missiles would probably look very threatening. In a possible U.S. first-strike counterforce attack, these missiles could potentially destroy the vast majority of the Soviet silo-based ICBM force within minutes of a U.S. decision to launch an attack. Thus, such a "prompt" U.S. counterforce capability would pose a first-strike threat to the Soviet ICBM force. Because the Soviet Union maintains the vast majority of its strategic capabilities in its ICBM force, and because Soviet submarines might be vulnerable to superior U.S. antisubmarine warfare capabilities, the Soviets might feel especially threatened by U.S. deployment of MX ICBMs or Trident II SLBMs. Some see the possibility that, faced with such a threat, a Soviet leadership perceiving a real prospect of war might be more inclined to launch their vulnerable ICBMs in a preemptive attack before they could be destroyed in a possible U.S. first strike. Such a Soviet incentive to shoot first in a crisis could make nuclear war--possibly accidental--more likely.

Silo-Based MX ICBMs

The way in which incentives to strike first in a crisis situation would be affected would depend upon how the United States deployed its counterforce capability. U.S. counterforce weapons deployed in a vulnerable basing system would provide the Soviet Union with a strong incentive to strike first in a crisis. In this case, the Soviets could destroy those U.S.

weapons that were threatening their own ICBMs by launching a preemptive counterforce strike. Because an effective preemptive strike could prevent the U.S. counterforce capability from being used to destroy Soviet ICBMs, Soviet leaders could have a powerful incentive to strike first against a vulnerable U.S. counterforce capability.

Powerful MX missiles based in vulnerable Minuteman silos, for example, could provide a strong incentive for the Soviets to strike first in a crisis. If the Soviets struck first in such a situation, they could destroy 90 percent of the U.S. counterforce capability while using only a fraction of their own ICBM force. Such a Soviet first strike would leave the United States with a weak second-strike capability to destroy the Soviet ICBMs held in reserve. If, instead, the Soviets waited for the United States to strike first, they would risk the destruction of more than 90 percent of their own ICBMs if the United States launched its powerful MX missiles against the Soviet land-based missiles. ^{30/} Furthermore, the United States, facing the same dilemma, would also have a strong incentive to strike first. Thus, because each side would be tempted to strike first in a crisis, MX missiles based in vulnerable silos could be destabilizing.

Mobile MX ICBMs

The Soviet incentive to strike first in a crisis would be less strong if the United States were to deploy counterforce weapons such as MX ICBMs in a more survivable basing system. For example, if an MX mobile basing system could be built with enough trenches or shelters to survive a large-scale Soviet ICBM attack, Soviet incentives to strike first in a crisis would be less powerful than if the U.S. counterforce capability were vulnerable. Soviet ICBMs would still be vulnerable to a possible U.S. first strike, but the Soviets would not be able to destroy the U.S. weapons threatening to their own ICBM force by launching a fraction of their missiles against the U.S. MX mobile ICBMs. As discussed above, however, it could be very expensive to build a survivable MX basing system. And the survivability of trench- or shelter-based mobile missiles could be threatened if the Soviets deployed more ICBMs of their own.

^{30/} Ibid.

Submarine-Based Trident II Missiles

Because it could be difficult to build a survivable land-based missile system, the United States might want to base a counterforce capability in submarines. U.S. submarines at sea are considered to be undetectable and thus invulnerable at the present time, and Trident submarines will be even quieter and harder to detect than existing Polaris and Poseidon submarines. Thus, a sea-based counterforce capability would not be vulnerable to a Soviet preemptive strike in the foreseeable future. Such a survivable sea-based U.S. counterforce capability might avoid the stability problems associated with vulnerable counterforce weapons--such as MX ICBMs based in fixed silos--that could be destroyed by a Soviet first strike. A survivable counterforce capability might even enhance stability if one believes that an unmatched Soviet counterforce capability might tempt Soviet leaders to attack the U.S. Minuteman force.

Trident submarines currently under construction could house a large, second-generation Trident II missile that could be developed by the mid-to-late 1980s. Trident II SLBMs would be much more accurate and carry more powerful warheads than the first-generation Trident I missiles that will initially be deployed in Trident submarines and some Poseidon submarines in the early 1980s; they would thus have a much better capability to destroy Soviet ICBM silos.

The Trident II missile's range of 6,000 nautical miles would also expand the ocean area available for submarine patrol, thus making the Soviet antisubmarine warfare task more difficult. In fact, Trident submarines carrying Trident II SLBMs would be able to operate near U.S. coastal waters where known antisubmarine warfare tactics would be virtually impossible to carry out. Under these circumstances, only a major Soviet breakthrough in some yet-to-be-developed satellite-based detection system could threaten U.S. submarines.

One major disadvantage of a sea-based counterforce capability is that it is difficult to maintain extreme accuracy in missiles based in submarines that do not have precise information on their position and velocity. External aids, such as Global Positioning System (GPS) satellites that will be able to give precise location information by the early 1980s, might be used to supplement Trident II's own inertial guidance. Dependence on external aids may, however, create new vulnerabilities--in this case, the possible vulnerability of the Global Positioning

System satellites. 31/ The accuracy of submarine-based missile warheads might also be improved by developing a terminally guided, maneuvering warhead (MaRV). Such a warhead would probably not be available until the 1990s, however. 32/

A sea-based counterforce capability would have other disadvantages. Communications systems for land-based ICBMs are considered much more secure and reliable and are capable of transmitting more detailed information than submarine communications systems. Moreover, two-way communications are possible with land-based missiles. In most counterforce scenarios, it would be important for the U.S. leadership to keep tight control over the nation's strategic forces, and communications would be an important aspect of such an effort. Thus, everything else being equal, a land-based counterforce capability would have advantages over a similar submarine-based capability. Moreover, a land-based counterforce capability--unlike a similar sea-based capability--would enhance the diversity of the U.S. retaliatory capability, thus improving the hedges against Soviet breakthroughs in antisubmarine warfare and air defense.

Bomber-Launched Cruise Missiles

Bomber-delivered weapons such as cruise missiles would be the only way to acquire a second-strike counterforce capability without simultaneously posing a first-strike threat to the Soviet ICBM force. Because of their great accuracy, cruise missiles would be very effective in destroying Soviet ICBM silos. But because bombers and cruise missiles would take several hours to reach their targets in the Soviet Union, they would not threaten a first strike. Thus, unlike MX or Trident II ballistic missiles, cruise missiles would provide an unambiguous second-strike counterforce capability.

31/ While a Soviet attack on the U.S. Global Positioning System satellites could impair the accuracy of Trident II missiles dependent on this system, it would also provide the United States with warning of an impending Soviet first strike.

32/ See 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 (March 1976), Part 11, pp. 5977, 6514.

Moreover, a bomber-based U.S. counterforce capability would be survivable, because bombers on ground alert can fly away from a Soviet attack on their bases. Thus, the Soviet Union would not have attractive targets for a preemptive first strike.

Reliance on cruise missiles for the counterforce role would not be without risk, however. Because of their slow speed, cruise missiles might become vulnerable to future Soviet fighters capable of detecting and intercepting low-flying aircraft or to surface-to-air missiles (SAMs) or anti-aircraft guns with radars powerful and sophisticated enough to detect objects flying close to the ground. These kinds of defenses might be especially effective in defending small point targets like ICBM silos. 33/

The proposed SALT II Protocol may include a cruise missile range limit of 2,500 kilometers (1,350 nautical miles). Such a limit, if extended into the 1980s, could potentially interfere with the ability of cruise missiles to reach Soviet ICBM fields--especially if range were defined as the maximum distance that cruise missiles could fly and did not include an extra allowance for the avoidance of defenses and unsuitable terrain.

Many analysts have also expressed concern that the Soviet Union might be able to deploy a perimeter air defense system around Soviet territory that would attempt to intercept U.S. cruise missile carrier aircraft before they could launch their cruise missiles. A Soviet perimeter defense could be a cause for concern if a future SALT agreement permanently restricted cruise missiles to a range of 2,500 kilometers. With such a range limitation, aircraft that were carrying cruise missiles would have to fly close to the border of the Soviet Union in order to deliver their cruise missiles to launch-points within range of Soviet ICBM fields. Under these circumstances, the cruise missile carrier aircraft might come within the reach of a possible future Soviet perimeter defense system consisting of a network of airborne radars and long-range interceptors. Large,

33/ If the Soviets deployed terminal air defenses around their ICBM fields, a slow U.S. counterforce capability might require penetrating bombers--such as the B-1--that could fire very accurate supersonic attack missiles through the terminal defenses.

wide-bodied U.S. cruise missile carrier aircraft might be especially vulnerable to such a perimeter defense. If a large percentage of U.S. cruise missile carriers could be destroyed before they launched their weapons, the effectiveness of the U.S. second-strike counterforce attack would be greatly reduced. For this reason, a U.S. second-strike counterforce capability consisting of additional bomber-delivered cruise missiles would probably require a less restrictive SALT cruise missile range limitation. 34/

Cruise missiles might be too slow in counterattacks against Soviet ICBM silos, allowing the Soviet Union time to launch their reserve ICBMs before the arrival of the U.S. cruise missiles. There are, however, reasons to question the utility of a Soviet decision to launch their ICBMs held in reserve after a counterforce strike against the United States. Because the Soviets would have already attacked U.S. strategic forces, the number of targets available for a second-round attack would be limited. U.S. cities would not be attractive targets for Soviet ICBMs because direct attacks on American cities would remove any U.S. incentive to refrain from retaliatory strikes against Soviet cities. Moreover, a Soviet leadership faced with the prospect that an attack on U.S. strategic forces would put their own ICBM force in jeopardy might be more reluctant to launch the initial attack.

Cruise missiles would also be relatively unthreatening to the Soviet Union. Because cruise missiles would be too slow to be used in a U.S. first strike, they would not force the Soviet Union to bear the same costs of replacing silo-based ICBMs that the United States may have to face in the 1980s.

SALT AND U.S. STRATEGIC FORCE PLANNING

The SALT negotiations will be an important consideration in decisions about the kinds of strategic forces to be developed and procured in response to projected Soviet threats. Different postures for the strategic forces call for different kinds of SALT agreements. For example, if the Congress wants to pursue a counterforce policy, then the United States should seek a SALT II

34/ An effective Soviet perimeter defense system might also push the United States in the direction of an advanced penetrating bomber.

agreement that allows the development and deployment of MX ICBMs, Trident II SLBMs, or long-range cruise missiles. None of the numerical limits contained in the proposed SALT II treaty would seriously restrict U.S. weapon programs. ^{35/} But the agreement may also include a Protocol that would remain in effect through September 1980, banning "new" ICBMs and SLBMs (categories that would include the MX ICBM and Trident II SLBMs), limiting cruise missiles to range of 2,500 kilometers, and restricting the launching of long-range cruise missiles from wide-bodied aircraft. If these provisions were incorporated into a SALT III agreement that continued through the 1980s, the United States could be prevented from acquiring a counterforce capability.

A desire to deploy a mobile land-based missile system would call for a SALT agreement that established procedures for verifying the number of mobile missiles deployed. The SALT II Protocol now being negotiated includes a temporary ban on mobile ICBMs. Such a temporary ban may serve to allow time to negotiate arrangements for counting mobile missiles. But such arrangements--possibly including onsite inspection--will eventually have to be agreed upon if the United States wishes to deploy mobile ICBMs and, at the same time, to maintain SALT restrictions on the numbers of strategic weapons that the United States and the Soviet Union may deploy.

A mobile missile system would gain its survivability from having more miles of trench or more shelters than the Soviet missile force could destroy. Thus, the size--and the cost--of the trench or shelter basing needed to insure that a large number of mobile ICBMs could survive a Soviet missile attack will depend

^{35/} The proposed SALT II treaty will probably include an aggregate delivery vehicle ceiling of 2,250; a 1,320 sublimit on multiple-warhead ICBMs and SLBMs and aircraft equipped with long-range cruise missiles; a second sublimit of 1,200 on multiple-warhead ICBMs and SLBMs; and a third sublimit of 820 on multiple-warhead ICBMs. See statement on SALT by Walter Slocombe, Director, DoD SALT Task Force, printed in the Congressional Record (April 4, 1978), p. S4764. The United States would be constrained by the 1,320 sublimit and the 1,200 subceiling on multiple-warhead ICBMs and SLBMs, but older multiple-warhead weapons such as Minuteman III ICBMs and Poseidon SLBMs could be retired to make room for new systems.

critically on the number and size of ICBMs that the Soviet Union deploys. For this reason, SALT limits on the Soviet ICBM program would be very important if the Congress wishes to deploy a mobile missile system. Limits on the lifting power of Soviet ICBMs, on the number of ICBMs that can be equipped with multiple-warheads, and on the number of warheads that can be carried on any given missile would be particularly useful.

On the other hand, the United States may want to avoid deployment of a mobile missile system and rely more heavily on the retaliatory capabilities of the submarine and bomber forces. If the Congress follows this policy for the strategic forces, particular attention should be given to SALT constraints on the range of cruise missiles. Because a range limit of 2,500 kilometers could prevent cruise missiles from reaching some targets in the Soviet Union, heavier reliance on the bomber force could call for a less restrictive range limitation.

CHAPTER III. U.S. OPTIONS

Decisions about the development and procurement of new strategic nuclear forces will require the Congress to make some fundamental judgments about U.S. deterrence strategy and to choose among some incompatible goals.

One major question of strategy that the Congress will consider will be whether or not to acquire a counterforce capability to match that being deployed by the Soviet Union. No one can know for sure what would deter a Soviet leadership in some future crisis. A U.S. threat to attack Soviet cities--coupled with the uncertainty of success that would face Soviet leaders as they consider any first-strike option--might be sufficient to deter a Soviet nuclear attack. Trident submarines armed with Trident I missiles and bomber-launched cruise missiles seem particularly well-suited for retaliation against Soviet industrial targets and general purpose military facilities.

A counterforce capability might be acquired through the deployment of MX ICBMs, Trident II SLBMs, or large numbers of cruise missiles. If the Congress believes that a President could never order an all-out retaliatory strike against Soviet cities so long as U.S. cities remained intact and that the Soviets might not be deterred unless the United States could counterattack against Soviet ICBMs, then a counterforce posture would be appropriate. On the other hand, the Congress may judge that a capability to destroy Soviet industrial and general purpose military targets should be enough to deter and that a threatening U.S. counterforce capability could make a Soviet leadership more likely to launch a preemptive first strike.

A second major issue will be the question of how much insurance against unexpected Soviet threats is enough. Programs to modernize the submarine and bomber forces are already underway. The big question will be whether or not the United States needs the extra insurance against threats to the submarine and bomber forces that a mobile land-based missile system would provide. If the Congress believes that this insurance policy is appropriate for the strategic forces, then a more survivable trench- or shelter-based ICBM system could be deployed.

These decisions about strategic force posture may compel the Congress to choose among incompatible goals. One such dilemma arises from the fact that the MX missile would be so accurate that its deployment as a means of maintaining a redundant and secure retaliatory capability would be incompatible with a desire to avoid the acquisition of a counterforce capability. Deployment of a mobile land-based missile system would also complicate the task of verifying a SALT agreement.

A second dilemma is that it would not be possible to build a second-strike counterforce capability with MX or Trident II ballistic missiles without simultaneously posing a first-strike threat to the Soviet ICBM force. Deployment of additional cruise missiles would be the only way to acquire a truly second-strike counterforce capability.

The options presented below show the kinds of strategic forces that would be consistent with different judgments about both the kind of deterrence strategy the United States should pursue and the relative importance of often incompatible goals. The options do not exhaust the list of possibilities. The numbers of weapons procured in each option could be varied without requiring a different set of political judgments. And certainly the Congress could consider various combinations of the options presented below.

OPTION I: BASE FORCE OF CRUISE MISSILES ON B-52s AND 20 TRIDENT SUBMARINES WITH TRIDENT I MISSILES

The Congress could elect to procure forces that are particularly well-suited for retaliation against Soviet industrial targets and general purpose military facilities. Under such a policy, the United States would rely both upon a threat to destroy Soviet industry and general purpose military forces and upon the uncertainties Soviet leaders would face in launching a first strike to deter nuclear attack by the Soviet Union. The acquisition of a U.S. counterforce capability would be judged not to be necessary.

A force reliant primarily on bomber-launched cruise missiles and Trident submarines with Trident I missiles would be attractive to those who believe that a counterforce war would be practically or politically indistinguishable from all-out nuclear war, that a Soviet counterforce attack that could not destroy the U.S. retaliatory capability would be a totally irrational act, and that

the immense uncertainties about how weapons would perform and how leaders would behave in the context of a nuclear war should deter any but the most irrational Soviet leadership. Such a policy could also be based on a belief that a U.S. counterforce capability that threatened the Soviet ICBM force would be destabilizing in a crisis because it could increase the chance that Soviet leaders would launch their vulnerable missiles before they could be destroyed in a possible U.S. first strike.

With a continued Trident building rate of three submarines every two years, the United States will have a force of 20 Trident submarines by the early 1990s, when the Poseidon fleet will be retired as a block. About half of the B-52 force could be armed with some 3,000 cruise missiles in the early 1980s. The rest of the B-52s, as well as the 60 FB-111 bombers, would continue to carry gravity bombs and short-range attack missiles. The U.S. ICBM force would continue to consist of silo-based Minuteman and Titan missiles. 1/ This force serves as a base force against which the costs of the additions made in the other four options can be measured.

A U.S. force heavily reliant on the retaliatory capabilities of submarines and bombers would provide the United States with less insurance against unexpected threats than today's TRIAD of three survivable parts. U.S. strategic forces would no longer hedge against the simultaneous vulnerability of submarines and bombers, and they would not maintain the current capability to destroy large portions of both the industrial and the general purpose military targets in the Soviet Union if either the U.S. submarines or bombers became unexpectedly vulnerable.

1/ The existing Minuteman ICBM force would probably provide very little second-strike retaliatory capability in the future; less than 10 percent of this force would be expected to survive a Soviet missile attack by the latter half of the 1980s. But the Minuteman ICBMs would continue to provide some utility for possible use in a limited nuclear war and as a means of maintaining a rough numerical balance between the U.S. and Soviet arsenals. Under this option--or any other--the Congress could choose to retire the silo-based missile force as it becomes increasingly vulnerable. The advantages gained from retirement include annual operating savings of about \$650 million (in constant fiscal year 1979 dollars) and the removal of potential targets for the Soviet ICBM force to attack.

Because the United States would be more dependent on its submarine and bomber forces, this option would require that close attention be paid to potential threats to these forces. The delays at the existing Trident shipbuilding yard may require the Congress to consider the feasibility of establishing a second source for Trident submarine construction in order to insure that 20 submarines could enter the fleet by the early 1990s. Heavy reliance on submarine-basing for the strategic forces could also call for the construction of an Extremely Low Frequency (ELF) communications system such as the Navy's Seafarer Project. Such a system could be used to send messages to submarines patrolling hundreds of feet below the ocean surface, where they would be harder to detect by improved Soviet antisubmarine warfare systems.

As Soviet air defense systems improve, it may also be necessary to make improvements in the cruise missile--especially by reducing its susceptibility to radar detection. With a nuclear deterrence posture heavily reliant on the retaliatory capabilities of cruise missiles, the Congress would probably want to pay particularly close attention to the possibility that permanent SALT restrictions on the range of cruise missiles might hamper the effectiveness of this weapon. Moreover, maintaining an effective bomber force may, at some time, require modernization of the aircraft that will penetrate Soviet airspace and deliver gravity bombs and supersonic short-range attack missiles.

This option--which also serves as a base force--would cost about \$120 billion from fiscal year 1979 to 2000 (see Table 1). ^{2/} This figure includes \$94 billion for operating costs and \$26 billion for investment. ^{3/} At a cost of more than \$56 billion, operating the bomber force (and the associated tankers) is by far the largest part of total operating costs. Procurement of 13 more Trident submarines, for a total of 20, and enough Trident I missiles to support a total force of 480 missiles, at a cost of about \$20 billion, accounts for most of the investment costs.

^{2/} All costs presented in this chapter are in constant fiscal year 1979 dollars.

^{3/} The \$26 billion investment cost for this option does not include the money that has already been authorized for the cruise missile and Trident programs through fiscal year 1978.

OPTION II: ADD TO THE BASE FORCE A MOBILE LAND-BASED MISSILE SYSTEM

Insurance against unexpected Soviet threats to the U.S. submarine and bomber forces could be acquired through the deployment of a survivable mobile ICBM system. Deployment of mobile ICBMs would provide the United States with three survivable basing systems for its strategic forces. With a three-part force, the United States would maintain a capability to destroy Soviet industrial targets even if the Soviet Union made two simultaneous breakthroughs in defensive systems. The United States would also attain a capability to destroy three-quarters of both the industrial and general purpose military targets in the Soviet Union if one part of the force were threatened.

Deployment of some sort of a mobile ICBM system would appeal to those who believe that the United States should have a high degree of insurance that the U.S. capability to devastate the Soviet Union in a retaliatory strike could not be compromised by unexpected developments. There will always be uncertainties about the possible vulnerability of U.S. forces--especially the vulnerability of U.S. bombers and cruise missiles to Soviet air defenses. And no one can rule out the possibility that the Soviets might make a technological breakthrough in the area of antisubmarine warfare, although that possibility seems extremely remote. Because the stakes are so high in the context of nuclear deterrence, and because many believe that deterrence depends on convincing Soviet leaders that there is virtually no chance that the Soviet Union could escape a devastating U.S. retaliatory strike, the Congress may want to deploy a mobile ICBM system in order to provide insurance against Soviet threats to the U.S. submarine and bomber forces.

Two mobile ICBM options are discussed here. Existing silo-based Minuteman III missiles could be modified and deployed in long underground trenches or in fields of multiple shelters. Alternatively, a small number of new MX missiles could be deployed in a trench or multiple shelter basing system. Either option would require construction of a large trench or shelter system in order to insure that a high percentage of the missiles could survive a Soviet ICBM attack and thus provide a significant second-strike retaliatory capability.

Because Minuteman missiles would not be as accurate as MX missiles, they would not threaten the Soviet silo-based ICBM force. Deployment of a mobile Minuteman force would thus be an

TABLE 1. COSTS OF OPTION I, BASE FORCE OF CRUISE MISSILES ON B-52s AND 20 TRIDENT SUBMARINES WITH TRIDENT I MISSILES: BY FISCAL YEARS, IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981
Present Force of 450 Minuteman II, 550 Minuteman III, and 54 Titan II ICBMs Operating	650	650	650
20 Trident Submarines with 480 Trident I Missiles Investment <u>a/</u>	1,270	2,980	1,960
Operating	0	0	30
Present Fleet of 10 Polaris and 31 Poseidon Submarines Investment <u>b/</u>	850	440	340
Operating <u>c/</u>	1,390	1,390	1,260
150 B-52s with 3,000 Cruise Missiles, and 165 B-52s and 60 FB-111s with SRAM and Bombs (including tanker support) Investment <u>d/</u>	420	470	550
Operating	2,560	2,560	2,560
Total Investment	2,540	3,890	2,850
Total Operating	4,600	4,600	4,500
Grand Total	7,140	8,490	7,350

(continued)

NOTES: Not included are the costs of nuclear warheads or the costs of certain functions such as strategic defense, surveillance, and command, control, and communications. Some programs now in the research and development stage are also not included. Numbers of missiles and aircraft refer to equipment in operating units. Additional procurement is included in the costs to account for spares, training, and maintenance.

a/ Seven Trident submarines have been authorized through fiscal year 1978; their procurement costs are not included in these costs.

TABLE 1. (Continued)

1982	1983	1979-1983	1979-2000
650	650	3,250	14,300
2,610 100	1,620 170	10,440 300	19,800 9,400
300 1,160	370 1,050	2,300 6,250	2,300 13,800
670 2,560	670 2,560	2,780 12,800	4,500 56,300
3,580 4,470	2,660 4,430	15,520 22,600	26,600 93,800
8,050	7,090	38,120	120,400

b/ Investment costs for the existing submarine fleet consist of procurement costs for backfitting 160 Trident I missiles into 10 Poseidon submarines.

c/ Operating costs assume that the 10 Polaris submarines are retired by 1983 and that the 31 Poseidon submarines are retired by 1993.

d/ If the B-52 force is replaced in the 1990s with a comparable mix of advanced penetrating bombers and wide-bodied cruise missile carriers, and if wide-bodied aircraft replace the present KC-135 tanker force, then an additional \$35-45 billion (in fiscal year 1979 dollars) might be required to maintain a strategic bomber force.

attractive option to these who believe that a U.S. counterforce capability would be destabilizing in a crisis.

Deployment of MX mobile ICBMs would have some advantages over a similar mobile Minuteman force. A small force of MX ICBMs would probably be somewhat less expensive than an equally effective force of mobile Minuteman III missiles. This is because an MX force would require fewer miles of trench or shelters and fewer support facilities than an equally effective mobile Minuteman force and because a small force of MX missiles would be cheaper to operate than a larger force of mobile Minuteman missiles. Development and procurement of a new MX ICBM would also provide the United States with a potential to respond rapidly to a Soviet technological breakthrough that threatened the U.S. bomber or submarine forces.

On the other hand, it would be almost impossible to avoid the acquisition of a powerful U.S. counterforce capability if the U.S. mobile land-based missile force consisted of MX ICBMs. Because of their great accuracy, even a small force of 200 MX missiles could be expected to destroy 80 to 90 percent of the Soviet ICBMs in a U.S. first strike. Thus, if the United States did not wish to acquire a counterforce capability, the number of MX missiles it procured would have to be small enough so that there would not be enough warheads to target all the Soviet ICBM silos. In fact, the MX force might have to be as small as 100 missiles. But if the missile force were so constrained, then an extremely large trench or shelter basing system would be required in order to insure that a significant land-based retaliatory capability could survive a Soviet first strike. Thus, deployment of MX missiles might not be an attractive option to those who wish to avoid the acquisition of a U.S. counterforce capability.

The extra insurance that a mobile ICBM system could provide would not be cheap. In order to insure that 60 percent of the Minuteman missiles could survive a Soviet attack of 820 large multiple-warhead ICBMs, 5,000 miles of protective trench basing or 8,600 shelters would be needed. Construction of such a basing system and modification of 550 Minuteman missiles for mobile deployment would require investment costs of about \$26 billion and operating costs of about \$8 billion, for a total cost of \$151 billion for strategic forces through fiscal year 2000 (see Table 2). If the SALT negotiations broke down and the Soviets deployed large, multiple-warhead ICBMs in all of their 1,400 existing silos, then about 5,700 additional shelters--at an additional cost of about \$6 billion--would be required to insure that 60 percent of the Minuteman missiles could survive a Soviet attack.

TABLE 2. COSTS OF OPTION II-A, ADDING 550 MOBILE MINUTEMAN III MISSILES TO THE BASE FORCE: BY FISCAL YEARS, IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981	1982	1983	1979-1983	1979-2000
Base Force (Option I)							
Investment	2,540	3,890	2,850	3,580	2,660	15,520	26,600
Operating	4,600	4,600	4,500	4,470	4,430	22,600	93,800
550 Modified Minuteman III Missiles in 8,600 Shelters							
Investment	160	350	530	730	1,980	3,750	25,900
Operating	0	0	0	0	0	0	8,200
Retirement of 550 Minuteman III Missiles in Silos							
Operating	0	0	0	0	0	0	-3,500
Total Investment	2,700	4,240	3,380	4,310	4,640	19,270	52,500
Total Operating	4,600	4,600	4,500	4,470	4,430	22,600	98,500
Grand Total	7,300	8,840	7,880	8,780	9,070	41,870	151,000

Alternatively, a force of 200 MX missiles in 5,800 shelters would cost about \$23 billion for procurement and about \$5 billion for operating costs (see Table 3).

Mobile ICBM systems would make the verification of SALT limits on the number of ICBMs that can be deployed more difficult than has been the case for silo-based ICBMs. Thus, a decision to deploy a mobile ICBM system will eventually require the negotiation of arrangements for verifying the number of mobile ICBMs deployed. The temporary ban on the deployment of mobile missiles that is contained in the SALT II Protocol could not be extended into the future. Similarly, if the United States wishes to develop and deploy MX ICBMs, the temporary ban on the testing of "new" ICBMs imposed by the SALT II Protocol could not be extended into the 1980s.

OPTION III: ADD TO THE BASE FORCE A PROMPT COUNTERFORCE CAPABILITY WITH MX MOBILE ICBMs

The United States could acquire a powerful counterforce capability by procuring 300 MX mobile ICBMs. If deployed in a trench or shelter basing system large enough to insure that a high percentage of the MX missiles could survive a Soviet attack on the MX system itself, such a force would provide the United States with a capability to destroy the vast majority of the Soviet ICBMs held in reserve and thereby reestablish a balance of strategic capabilities remaining after a counterforce exchange.

Deployment of a large-scale MX system would be an attractive option to those who believe that U.S. acquisition of a counterforce capability would enhance stability and deterrence. A counterforce capability would provide the United States with an alternative way to respond to a limited nuclear attack by the Soviet Union--in addition to the U.S. capability to retaliate against the Soviet industrial target base and general purpose military targets. This might enhance the credibility of the U.S. nuclear deterrent. Such a counterforce posture would be consistent with a judgment that a U.S. President could never order an all-out retaliatory strike against Soviet cities as long as the Soviet Union had not attacked U.S. cities first.

U.S. deployment of a large number of MX missiles would also be consistent with a judgment that long-term stability and U.S. security would be improved if the Soviets were forced to

TABLE 3. COSTS OF OPTION II-B, ADDING 200 MX MISSILES TO THE BASE FORCE: BY FISCAL YEARS,
IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981	1982	1983	1979-1983	1979-2000
Base Force (Option I)							
Investment	2,540	3,890	2,850	3,580	2,660	15,520	26,600
Operating	4,600	4,600	4,500	4,470	4,430	22,600	93,800
200 MX Missiles in 5,800 Shelters							
Investment	160	540	990	1,420	1,230	4,340	23,100
Operating	0	0	0	0	0	0	5,300
Retirement of 200 Minuteman III Missiles in Silos							
Operating	0	0	0	0	0	0	-1,400
Total Investment	2,700	4,430	3,840	5,000	3,890	19,860	49,700
Total Operating	4,600	4,600	4,500	4,470	4,430	22,600	97,700
Grand Total	7,300	9,030	8,340	9,470	8,320	42,460	147,400

abandon silo-basing for their ICBMs in favor of a more survivable mobile land-based missile system of their own that would be less threatening to the United States. A decision to develop a powerful U.S. counterforce capability might also be based on a belief that perceptions of U.S. nuclear power and national resolve would be improved and that future arms control efforts would be furthered by a new U.S. weapon program threatening to the Soviet Union.

A land-based U.S. counterforce capability would have some advantages over a similar sea- or bomber-based capability. It is easier to communicate with land-based systems than with either sea- or bomber-based systems and, during a limited nuclear war, communications would be of the utmost importance. Deployment of a mobile land-based missile system would also provide a third survivable basing system for U.S. forces, thus enhancing the redundancy and diversity of U.S. strategic forces. Moreover, land-based MX ICBMs would probably be more accurate and available sooner than submarine-based Trident II missiles and additional Trident submarines. And MX ICBMs--unlike bomber-delivered cruise missiles--would not face potential difficulties in penetrating Soviet air defenses as long as antiballistic missile systems continue to be impractical and prohibited by treaty.

Procurement of a force of 300 MX missiles and construction of 8,500 shelters--enough to insure that 50 percent of the MX missiles could survive a Soviet attack of 820 large multiple-warhead ICBMs on the MX system itself--would require investment costs of about \$30 billion and operating costs of \$7.6 billion. The total cost for strategic forces would thus be \$156 billion through fiscal year 2000 (see Table 4). If there were no SALT agreement, then 4,600 additional shelters could be required, and the cost for the MX system could be \$5 billion higher.

The Administration's budget for fiscal year 1979 provides only \$158 million for the MX program, postponing full-scale development until missile system basing tests are completed in calendar year 1978. This will delay initial deployment of MX missiles until at least 1986. ^{4/} If the Congress wishes to maintain an option to deploy the MX system earlier in the decade--closer to the time when the threat to the Minuteman force

^{4/} Department of Defense, Annual Report, Fiscal Year 1979, p. 291.

TABLE 4. COSTS OF OPTION III, ADDING 300 MX MISSILES TO THE BASE FORCE: BY FISCAL YEARS,
IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981	1982	1983	1979-1983	1979-2000
Base Force (Option I)							
Investment	2,540	3,890	2,850	3,580	2,660	15,520	26,600
Operating	4,600	4,600	4,500	4,470	4,430	22,600	93,800
300 MX Missiles in 8,500 Shelters							
Investment	160	540	1,020	1,440	2,350	5,510	29,500
Operating	0	0	0	0	0	0	7,600
Retirement of 300 Minuteman III Missiles in Silos							
Operating	0	0	0	0	0	0	-1,900
Total Investment	2,700	4,430	3,870	5,020	5,010	21,030	56,100
Total Operating	4,600	4,600	4,500	4,470	4,430	22,600	99,500
Grand Total	7,300	9,030	8,370	9,490	9,440	43,630	155,600

will become more serious--then funds for full-scale development (perhaps an additional \$100 million) might be authorized in fiscal year 1979. Such a course might conflict with a desire to complete testing of the basing system before further development is begun, but it would provide the option to begin deployment of MX missiles by 1985.

As mentioned above, a decision to develop and deploy a new mobile ICBM such as MX could affect the U.S. SALT negotiating position. If the Congress wishes to deploy the MX missile system, the extension of the temporary ban on mobile land-based missiles and on "new" ICBMs that may be contained in the SALT II Protocol would be unacceptable.

OPTION IV: ADD TO THE BASE FORCE A PROMPT COUNTERFORCE CAPABILITY WITH TRIDENT II SLBMs

The United States could acquire a sea-based counterforce capability by developing and deploying the Trident II SLBM and by accelerating the Trident submarine building rate from an average of three submarines every two years to three a year in the early 1980s. This would result in a force of 32 Trident submarines with 768 Trident II missiles--rather than 20 submarines with 480 Trident I missiles--by the early-to-mid 1990s. With a submarine force of this size, the United States would have enough sea-based weapons to destroy more than three-quarters of the industrial targets in the Soviet Union and to attack Soviet ICBM silos as well.

A U.S. sea-based counterforce capability would deny the Soviet Union attractive strategic targets in the United States that might be attacked in a counterforce war. Thus, deployment of additional submarine-based missiles might decrease Soviet incentives to strike first in a crisis, and it could reduce the American civilian casualties that would be expected to result if a limited nuclear war did occur. Such an option might be attractive to those who have high confidence in the present and future invulnerability of the U.S. submarine force. And because the survivability of U.S. submarine-based Trident II missiles--unlike land-based MX missiles--would not be threatened by a continued Soviet buildup of ICBMs, it might be desirable to move more U.S. strategic capabilities to sea rather than attempting to maintain a survivable land-based missile system.

A policy that placed greater reliance on the submarine-based missile force would require that additional attention be paid to

the problems of submarine communications, SLBM accuracy, and shipbuilding. Communications with submarines could be improved by construction of an Extremely Low Frequency (ELF) system. Submarine communications would never be as good as those with land-based forces, however, because an ELF system would not provide two-way communications and would be unable to transmit as much information as land-based ICBM communications systems in a short space of time.

A sea-based counterforce capability would also require the development of improved accuracy systems for submarine-launched ballistic missiles. If the United States wishes to deploy Trident II missiles that are accurate enough to destroy Soviet ICBM silos by the mid-to-late 1980s, acceleration of the SLBM Improved Accuracy Program and of the Advanced Ballistic Reentry Systems (ABRES) Program might be advisable. 5/

If the Congress wishes to increase U.S. submarine-based capabilities by accelerating the Trident submarine building rate to three a year by the early 1980s, particular attention would have to be paid to the cost overruns and delays that have occurred at the existing Trident shipbuilding yard. In order to accelerate the Trident building rate, the Congress might want to provide funds--perhaps \$200 million--to open a second shipbuilding yard for Trident construction.

It would probably be no less expensive to acquire a submarine-based counterforce capability than it would be to deploy 300 MX mobile ICBMs. From fiscal years 1979 to 2000, procurement of 12 additional Trident submarines and 768 Trident II missiles for the entire 32-boat Trident fleet would add about \$28 billion to the costs for the Option I base force. Operating 12 extra submarines would cost about \$4.2 billion through fiscal year 2000. This would result in a total cost for the strategic forces of \$153 billion through fiscal year 2000 (see Table 5).

A decision to increase U.S. submarine-based nuclear capabilities might facilitate the negotiation of a SALT agreement that could ultimately lead to a more stable strategic balance. Basing new U.S. counterforce missiles in Trident submarines rather than

5/ The Advanced Ballistic Reentry Systems Program includes efforts to develop new reentry vehicles, including terminally guided Maneuvering Reentry Vehicles (MaRVs).

TABLE 5. COSTS OF OPTION IV, ADDING 12 EXTRA TRIDENT SUBMARINES AND 768 TRIDENT II MISSILES TO THE BASE FORCE: BY FISCAL YEARS, IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981	1982	1983	1979-1983	1979-2000
Base Force (Option I)							
Investment	2,540	3,890	2,850	3,580	2,660	15,520	26,600
Operating	4,600	4,600	4,500	4,470	4,430	22,600	93,800
12 Extra Trident Submarines and 768 Trident II Missiles							
Investment <u>a/</u>	20	350	1,790	1,880	2,950	6,990	28,000
Operating	0	0	0	0	0	0	4,200
Total Investment	2,560	4,240	4,640	5,460	5,610	22,510	54,600
Total Operating	4,600	4,600	4,500	4,470	4,430	22,600	98,000
Grand Total	7,160	8,840	9,140	9,930	10,040	45,110	152,600

a/ Assumes second Trident shipbuilding yard is established in fiscal year 1980 with first delivery in fiscal year 1988. Net costs for the Trident II missile program include savings that would be realized from procuring 340 Trident I missiles rather than 480 missiles in the early 1980s.

in underground trenches or fields of multiple shelters would contribute to SALT verification procedures in which there could be a high degree of confidence. In addition, the United States could agree to provisions banning mobile land-based missiles and "new" ICBMs, provisions that might lead the Soviets to move more of their own strategic forces to sea. Such a trend could lead to a much more stable situation in which most of both sides' missiles would be relatively invulnerable to counterforce attacks. But a ban on "new" submarine-launched ballistic missiles--another provision that may be contained in the proposed SALT II Protocol--would, if made permanent, prevent U.S. development and deployment of Trident II missiles.

OPTION V: ADD TO THE BASE FORCE A SLOW COUNTERFORCE CAPABILITY WITH CRUISE MISSILES

The United States could acquire a capability to destroy Soviet ICBM silos in a second strike without posing a first-strike threat to the Soviet ICBM force by procuring large numbers of bomber-delivered cruise missiles and wide-bodied cruise missile carrier aircraft. Such a "slow" counterforce capability might be an attractive option to those who believe that the United States should have the capability to respond in kind to a Soviet counterforce attack but should, at the same time, avoid posing a potentially destabilizing first-strike threat to Soviet strategic forces.

The procurement of 75 wide-bodied cruise missile carrier aircraft (such as Boeing 747s) and 4,800 additional long-range cruise missiles would add enough weapons to the bomber force to target two cruise missiles on each of the 1,400 Soviet ICBM silos, assuming that 60 percent of the carrier aircraft was maintained on alert.

Dependence on cruise missiles for the counterforce role would require efforts to improve the range and capability of these weapons. Additional range might be necessary to reach Soviet ICBM fields, to provide extra fuel for evasive maneuvers, and to allow cruise missile carrier aircraft to launch their weapons far enough from Soviet borders to remain beyond the reach of long-range Soviet interceptors. A more capable cruise missile with a reduced radar visibility--and possibly greater speed--might be necessary to penetrate potential Soviet terminal defenses around ICBM fields.

Procurement of 4,800 additional cruise missiles and 75 wide-bodied aircraft would be a relatively inexpensive way of acquiring a U.S. second-strike counterforce capability. Such an option would add about \$10 billion to the procurement costs of the base force. Operating this force would cost about \$5.5 billion through fiscal year 2000, resulting in a total cost for the strategic forces of \$136 billion through fiscal year 2000 (see Table 6). Over the next five years, costs would be relatively small because it would take several years to complete the production of cruise missiles for the B-52 force and begin production of additional cruise missiles for a wide-bodied carrier aircraft force.

A decision to increase reliance on the bomber force might affect arms control negotiations. Because their ICBM force would not be threatened, the Soviets would not be pressured by U.S. weapon programs to deploy additional ICBMs or mobile land-based missiles. Cruise missile carrier aircraft would also be easier to count than MX mobile ICBMs. Moreover, the United States could afford to agree to SALT provisions banning mobile ICBMs, "new" ICBMs, and "new" SLBMs.

Permanent limits on the range of cruise missiles, however, would not be acceptable--especially with a bomber force including wide-bodied aircraft that could potentially be vulnerable to long-range Soviet interceptors. Under a slow counterforce policy, the United States could not agree to the reported Soviet SALT II position that would allow only existing heavy bombers--that is, B-52s--to launch long-range cruise missiles. ^{6/} Moreover, the negotiation of future arms control measures equally limiting to both sides might become more difficult if U.S. and Soviet strategic forces became very asymmetrical, with the United States relying heavily on bombers and cruise missiles and the Soviets depending on large silo-based ICBMs.

Table 7 summarizes the costs of the five options.

^{6/} See Richard Burt, "U.S. Says Soviet Snags Arms Talks by Demand on Cruise-Missile Curb," New York Times (May 27, 1978), p. 2.

TABLE 6. COSTS OF OPTION V, ADDING 75 CRUISE MISSILE CARRIERS TO THE BASE FORCE: BY FISCAL YEARS, IN MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979	1980	1981	1982	1983	1979-1983	1979-2000
Base Force (Option I)							
Investment	2,540	3,890	2,850	3,580	2,660	15,520	26,600
Operating	4,600	4,600	4,500	4,470	4,430	22,600	93,800
75 Wide-Bodied Cruise Missile Carriers and 4,800 Cruise Missiles							
Investment	40	30	10	10	780	870	10,100
Operating	0	0	0	0	0	0	5,500
Total Investment	2,580	3,920	2,860	3,590	3,440	16,390	36,700
Total Operating	4,600	4,600	4,500	4,470	4,430	22,600	99,300
Grand Total	7,180	8,520	7,360	8,060	7,870	38,990	136,000

TABLE 7. SUMMARY OF COSTS OF FIVE OPTIONS: BY FISCAL YEARS, IN
MILLIONS OF CONSTANT FISCAL YEAR 1979 DOLLARS

	1979-1983	1979-2000
Base Force (Option I)	38,120	120,400
Additions to Base Force		
Add Mobile Minuteman III (Option II-A)	3,750	30,600
Add 200 MX (Option II-B)	4,340	27,000
Add 300 MX (Option III)	5,510	35,200
Add Trident II (Option IV)	6,990	32,200
Add Cruise Missile Carriers (Option V)	870	15,600