dismantling systems in accordance with specific arms-control procedures. Such procedures include disassembling silos and cutting up bombers and submarines in order to ensure that they are no longer useful as strategic launchers. Under SALT provisions, for example, dismantling would cost approximately $1.5 million per ICBM silo, $13,000 per B-52 bomber, and $21.7 million per Poseidon submarine. 6/ Costs could change depending on the procedures developed in a START agreement; they would almost certainly be higher than the costs of simply putting the systems out of commission.

Even with these added costs there would be net savings of about $15 billion through the end of the century (see Table 5). In total, however, this would amount to a few percent of total strategic spending.

TABLE 5. ESTIMATED OPERATING COST SAVINGS RESULTING FROM START COMPLIANCE (By fiscal year, in millions of fiscal year 1984 dollars)

Cost Category	1984	1985	1986	1987	1988	Total 1984-2000
Budget Authority	--	--	46	249	500	15,438
Outlays	--	--	27	155	349	a/

a/ Outlay savings provided for 1984-1988 only.

IMPACT OF SALT LIMITS COMPARED TO THAT OF START LIMITS

SALT restrictions, which did not specify direct reductions in numbers of warheads, would have even more modest effects if applied to the modernization program than would START limits. On key measures like numbers of

6. Estimates provided by respective service staffs.

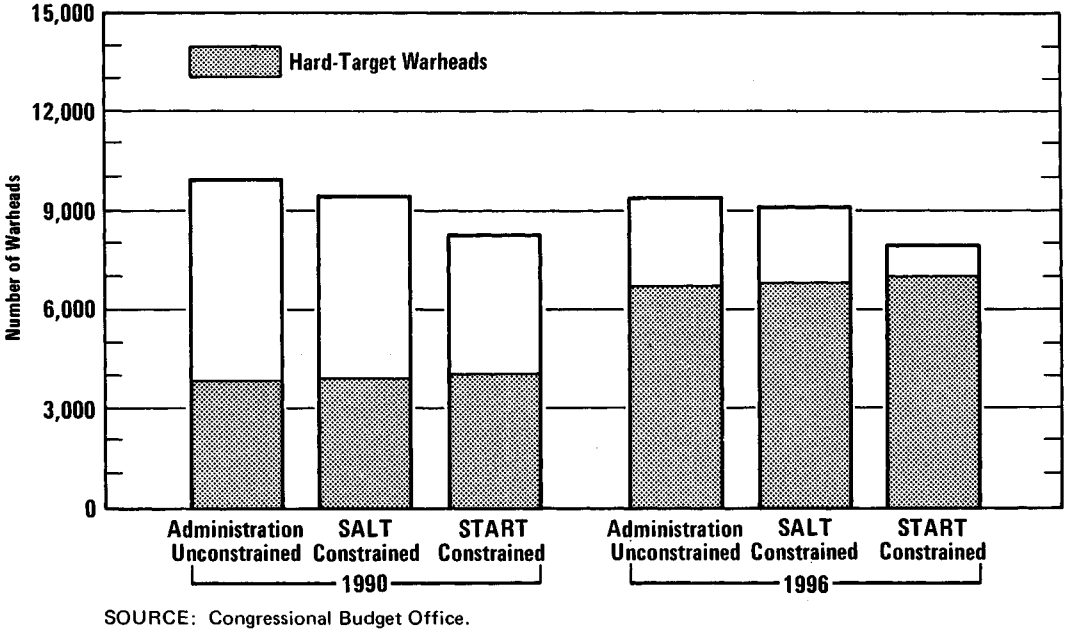
surviving hard-target warheads, however, SALT and START could have nearly identical effects. Figure 9 compares the size of U.S. forces in 1990 and 1996 under the numerical limits imposed by SALT and START with the unconstrained force. In both instances of arms controls, full modernization is assumed to be achieved; numerical limits are met primarily by retiring older existing systems. In both SALT- and START-constrained cases, surviving hard-target warhead counts grow substantially. In terms of surviving hard-target capability, forces under SALT limits and START limits differ by at most 3 percent. (See Appendix F for a technical discussion of current arms-control restrictions and the potential impact of SALT on U.S. forces.)

CONCLUSION

Arms-control constraints would not have much effect on the Administration's modernization program. Numerical limits--with the possible exception of the START limit of 850 on ballistic missiles--under either

Figure 9.

Comparison of Forces Under Arms Control Constraints, 1990 and 1996 (Post-Strike Attack, With Warning)



SOURCE: Congressional Budget Office.

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SALT or START could be met by retiring older existing weapons systems, with only modest effects on capabilities to destroy hardened targets. These approaches to meeting arms-control limits would not greatly reduce costs.

The Congress may, however, wish to consider alternatives to the Administration's strategic program that would reduce costs beyond the savings obtainable from arms limitations. The next chapter outlines some alternative approaches.

CHAPTER IV. THE ADMINISTRATION'S PROGRAM AND ALTERNATIVES

The previous chapters examined the Administration's program for strategic offensive force modernization and the potential effects on it of arms limitations. The program would engender a substantial buildup in weapons in the 1980s, primarily from modernization of the bomber and submarine forces. In the 1990s, however, the deployment of additional Trident submarines with Trident II (D-5) missiles and possibly a new land-based ICBM would be partially offset by retirements of older systems. Nonetheless, all three legs of the triad would enter the 21st century with major systems less than 15 years old.

Some have argued that this buildup is too broad--since it involves modernizing one or more systems in each leg of the triad--and introduces some systems that are technically risky. Others argue that the buildup is unnecessary because U.S. forces and weapons are already sufficient to deter a Soviet first strike. These arguments are reinforced by cost considerations: total spending on strategic forces in the next five years alone would cost an estimated $250 billion. During these years the federal government's annual budget deficits are projected, by both the Administration and CBO, at between $100 billion and $200 billion.

This chapter reviews the Administration's proposal and considers alternatives that would hold down costs. One such alternative would eliminate the near-term modernization of the land-based missile force by cancelling the proposed deployment of 100 MX missiles in Minuteman silos. A second alternative would forgo totally the Administration plan for modernizing the land-based missile force, substituting sea-based forces for this capability. A third alternative would terminate plans to deploy the B-1B bomber, choosing instead to rely more heavily on B-52s armed with cruise missiles and later on the Advanced Technology Bomber.

THE ADMINISTRATION'S PROGRAM

Scope and Effects

The Administration's plan--outlined in detail in Chapter II--is far reaching, both in breadth and in time. It would, within the next decade and a half:

- o Deploy 100 large, counterforce-capable MX missiles;
- o Deploy a yet undetermined number of follow-on ICBMs--perhaps more MX missiles or a small ICBM (SICBM);
- o Field two new bombers and about 3,200 air-launched cruise missiles;
- o Build and deploy about 20 Trident submarines armed with a new missile that will, for the first time, bring to the sea-based forces the capability to destroy targets hardened against nuclear blasts.

This modernization program would greatly increase U.S. strategic capability (see Chapter II for details). Total warheads likely to survive a major Soviet attack and be available for retaliation would rise from about 6,000 today to 9,900 in 1990, falling to 9,300 in 1996 as older systems were retired. Surviving warheads able to destroy targets hardened against nuclear blast would rise much more quickly, from about 1,400 today to 3,900 in 1990 and 6,700 in 1996.

By the 1990s, U.S. forces would also be substantially more modern than today. One gauge of modernization is the percentage of total warheads carried on forces less than 15 years old. This percentage captures not only the age of forces but also the extent to which newer forces carry a larger number of warheads (15 years being a reasonable midpoint in the lives of many strategic systems). Under the Administration's program, the percentage of warheads carried by strategic bombers less than 15 years old would rise from 10 percent today to 60 percent by 1990 and 65 percent by 1996, as the B-1B and Advanced Technology Bomber entered service. For submarines, the measure would rise from 10 percent today to 32 percent in 1990 and 58 percent in 1996, as the Trident submarine with the large D-5 missile entered the fleet and existing Poseidon submarines were retired in the 1990s. Only land-based missiles would show an opposite trend. Warheads carried on systems less than 15 years old would go from 77 percent today to 36 percent in 1990; the exact percentage in 1996 would depend on how many follow-on missiles were deployed, but the effect of new deployments would probably be overshadowed by the 900 existing Minuteman missiles that would remain in the force.

As noted in Chapter I, this buildup and modernization of strategic forces would parallel actions taken by the Soviet Union over the last decade.

Costs

CBO estimates that it would cost approximately $50 billion a year in budget authority--or a total of about $250 billion over fiscal years 1984-

1988--to build, modify, and operate all of the strategic forces and their associated elements. The estimates include both direct costs and indirect costs, such as personnel support. (These approximations are based on estimates made last year, since details of direct and indirect costs beyond 1984 are not available for the Administration's latest five-year defense plan. The costs should, however, provide a rough guide to likely totals under the latest program.)

Within this total, investment costs of strategic offensive forces would reflect the timing and production of key systems: the MX missile and B-1B bomber in the mid-1980s; the Advanced Technology bomber, Trident II missile, and SICBM in later years. Operating costs would increase during the late 1980s and early 1990s as new forces were added and only a few older systems were retired. Later, when many currently deployed systems are retired, operating costs would decrease.

ALTERNATIVE 1: TERMINATE THE MX MISSILE PROGRAM

As the initial effort in its major program to modernize the ICBM force, the Administration proposes to deploy 100 MX missiles in existing Minuteman underground silos located in Wyoming and Nebraska. The first of these missiles would be available in about 1986; all would be in place by about the end of 1988. According to the Administration plan, the follow-on modernization of land-based missile forces could involve further deployment of MX missiles beyond this initial increment or possibly deployment of a new small ICBM, depending on the outcome of research and development on the SICBM as well as progress on arms control.

The Congress has previously considered the deployment of MX missiles in Minuteman silos. The Department of Defense budget request for 1983 recommended deployment of 40 MX on an interim basis, but the Congress ultimately rejected this--largely out of concern that the MX would be unable to survive a Soviet first strike.

The alternative described here would also reject the deployment of MX missiles, but would retain the rest of the Administration's strategic program--including deployment of a follow-on land-based missile intended to preserve the triad of strategic forces. Forgoing the MX would mean giving up certain qualitative advantages that some believe are important. But, by most quantitative measures, it would have little effect on the measurable capabilities of U.S. retaliatory forces after riding out a Soviet attack, largely because MX missiles in silos would not be likely to survive a Soviet first strike.

The Case for Deploying the MX

The Contribution of Uncertainty to Deterrence. Estimates of what might happen to MX missiles in a first strike are based on theoretical calculations. The Soviets might well be uncertain as to their ability to destroy all or even most of the MX missiles, and this very uncertainty could contribute to deterrence.

Moreover, the Soviets could not be certain that the United States would choose to ride out a first strike rather than launch its MX missiles promptly in response to an attack. If, for example, all 100 missiles were launched early enough to avoid the entire Soviet attack, then about 950 warheads would survive and retaliate (some would presumably be lost because of malfunction during launch). In 1990 and 1996 this would represent about 8 percent of all U.S. strategic warheads available for retaliation in an attack with warning, and 17 and 11 percent of warheads able to destroy hardened targets in those years.

U.S. policy neither assumes nor precludes such a "launch on warning" or "launch under attack." Reportedly, the United States already has the capability to launch Minuteman missiles in this manner. 1/ Even if it did not plan to adopt such a strategy with the MX, the possibility that it might would add uncertainty to Soviet decisions and hence could contribute to deterrence.

Qualitative Advantages of the MX. The MX system would offer some other qualitative advantages. The President's Commission on Strategic Forces stated that deploying the MX in Minuteman silos would be an important step toward achieving the long-term goal of a survivable land-based missile force. With the MX, the United States would field a missile capable of destroying promptly even the hardest known Soviet installations--most notably ICBM silos and command and control facilities--comparable to present Soviet capability. The Administration has argued that this would give the Soviets a strong incentive to conclude an arms-control agreement.

At a minimum, the MX could be a signal of U.S. determination to maintain its nuclear stance. It has been 13 years since the United States last fielded a new land-based ICBM. During that period the Soviets have introduced an entirely new generation of ICBMs, and are apparently testing two more ICBMs of another new generation. Deploying the MX may be

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1/ See U.S. House of Representatives, House Appropriations Committee, Department of Defense Appropriations for 1983, 97:2, Part 1, pp. 340-41.

necessary to convince the Soviets that the United States is serious about maintaining a strong land-based force. The decision would also be a positive signal to the European allies as the time approaches for deploying new intermediate-range nuclear forces on the continent.

In addition to providing some capability relatively soon, deploying a substantial number of the MX in silos would open an ICBM production line so that production could be expanded later should conditions dictate. Examples of situations that could create a demand for more MX missiles are: lack of success in developing or deploying an SICBM, a rapid buildup in Soviet anti-ballistic missile (ABM) capability, or failure to reach an acceptable arms-control agreement.

Finally, those who favor deploying the MX in silos point to the need to maintain and strengthen the land-based missile force, with its desirable attributes such as assured command and control, accuracy of warheads, high alert rates, and targeting flexibility. Land-based missiles have long been thought to offer the most reliable command and control, since this does not entail communicating with an airborne bomber or a submarine at sea. Land-based missiles, with their fixed locations, also offer the most accurate warheads, although the new Trident II (D-5) missile in Trident submarines should approach the accuracy of the MX. Finally, land-based missiles provide targeting flexibility. With their reliable and rapid communications, they can be retargeted very quickly.

The Case Against Deploying the MX

Low Survivability. U.S. strategic forces traditionally have been designed to survive a Soviet first strike and then retaliate. This is thought to provide the greatest deterrent, since it is not clear that a president would launch U.S. forces before actual nuclear explosions confirmed a Soviet attack. Neither is it clear that uncertainty about U.S. actions would deter the Soviets as fully as knowledge that U.S. forces could survive and retaliate after an attack.

Thus, the growing vulnerability of Minuteman ICBMs to a Soviet first strike has been of concern for a number of years; indeed, it was primarily this concern that led to development of the MX missile and the search for a survivable basing mode for it. The MX itself, however, would be no more survivable than its predecessors. Assuming that the United States "rode out" a Soviet first strike on its ICBMs, CBO estimates that about 10 percent of the MX missiles would survive such an attack in 1990, and about 5 percent would survive in 1996 as the accuracy of Soviet missile systems improved. These estimates assume that the MX missiles would be placed in

existing Minuteman silos, where they would be about as blast-resistant as Minuteman missiles are today. 2/

Recently, Administration spokesmen have indicated that it might be possible to "superharden" existing Minuteman silos containing the MX to levels nearly 13 times their current hardness. 3/ Indeed, the Administration's modernization plan includes funds for further research on silo hardening over the next five years, although not for actual hardening.

Superhardening would be very effective against today's Soviet threat, but CBO estimates that the combination of improving accuracy and potentially higher warhead yields will eventually render even superhardened silos vulnerable (see Table 6). This would be especially true if the number of such targets was limited--say, to 100 MX missiles--because the Soviets could concentrate on them more easily. For example, if in 1990 (when the MX would be deployed) the Soviets were to attack a superhardened Minuteman silo with a very large, accurate warhead--such as the 25-megaton warhead that has been tested on existing Soviet SS-18 missiles--its probability of survival would be about 6 percent. Superhardening might, however, contribute something to deterrence by increasing the uncertainty in Soviet calculations of the expected outcome of an attack, or by causing the Soviets to trade off multiple warheads for large, single warheads on some of their larger missiles. The remainder of this discussion assumes neither superhardening of missile silos nor extraordinary responses by the Soviets.

In the framework of the Administration's modernization plan and the attendant strategic buildup, the quantitative contribution of MX missiles after a Soviet first strike would be very small. In the scenario thought most likely--in which U.S. forces are alerted in anticipation of a major Soviet attack and then ride out such an attack and retaliate--100 MX missiles in silos would contribute less than 1 percent of all available surviving strategic warheads in 1990 and 1996. Of warheads able to destroy structures hardened against nuclear blast, the MX would contribute about 3 percent in 1990 and less than 1 percent in 1996.

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2. Air Force officials have previously indicated this to be the case. See, for example, testimony of Lt. Gen. Kelly Burke, House Armed Services Committee, DoD Authorization for Appropriations for Fiscal Year 1983, 97:2, p. 256.

3. Based on testimony of Dr. Richard DeLauer, Undersecretary of Defense for Research and Engineering, before the House Defense Appropriations Subcommittee, May 3, 1983.

TABLE 6. TWO-SHOT DAMAGE EXPECTANCY FOR VARIOUS WARHEAD AND SILO HARDNESS CHARACTERISTICS a/

Accuracy b/	Silo Hardness (psi) Today (2,000 psi)	Hardened (5,000 psi)	Superhardened (25,000 psi)
		Yield 0.5 Megatons	
Today	0.77	0.55	0.21
1990	0.88	0.70	0.33
1996	0.94	0.90	0.57
		Yield 5.0 Megatons	
1990	0.95	0.95	0.81
1996 c/	0.95	0.95	0.93
		Yield 25.0 Megatons d/	
1990 c/	0.95	0.95	0.94
1996 c/	0.95	0.95	0.95

a/ Assumes two-shot compound missile/warhead reliability would be 95 percent for two groundburst weapons. Probabilities of destruction would be greater if optimal airbursts were used.

b/ Approximate accuracies assumed are: today = circular error probable (CEP) of 900 feet, 1990 = CEP of 720 feet, and 1996 = CEP of 480 feet.

c/ In addition to damaging silos by overpressure, these yield/accuracy combinations would be expected to produce blast craters sufficiently large and deep to envelop the silos.

d/ The Soviets are estimated to have deployed warheads with yields of approximately 25 megatons on a limited number of their SS-18 ICBMs.

In other scenarios, the contribution of the MX would be slightly higher. Because ICBMs are capable of maintaining higher percentage alert rates than bombers and submarines, their contribution in case of a surprise attack would be greater than in an attack with warning. Nonetheless, even in a surprise attack, 100 MX missiles in Minuteman silos would contribute only 5 percent of all surviving hard-target warheads in 1990 and 1 percent in 1996.

The MX would make its greatest contribution--albeit in most cases a modest one--in the prompt, hard-target warhead category. This measure indicates the number of weapons able to destroy targets hardened against nuclear blast, and to do so promptly after a Soviet first strike. Prompt, hard-target kill capability could be important in a limited nuclear war that involved a series of strikes and counterstrikes similar to those of a non-nuclear battle. In such a limited war, it might be important to destroy hardened Soviet targets--like missile silos and command bunkers--quickly in order to minimize Soviet capabilities in subsequent strikes. Even greater, however, would be the deterrent value of this capability, because it could prevent the Soviets from coercing the United States with threats of limited nuclear war.

The percentage contribution of the MX to prompt, hard-target capability would reach a peak in the late 1980s and early 1990s, and then decline. Unfortunately, the definition of "prompt" varies with the scenario, and so is very uncertain. Some might argue that land-based missiles are the only systems that can retaliate promptly after a Soviet first strike, in which case the MX would contribute about 50 percent of U.S. capability in 1990, but only 7 percent in 1996 with the assumed deployment of the small ICBM. Others would argue that Trident submarines with the new D-5 missile could also offer prompt, hard-target kill capability. If so, by 1996 the MX would contribute between 2 and 3 percent of surviving U.S. capability, depending on whether the attack occurred with or without warning.

Under the START limits, the relative contribution of the MX would likely be less because the numbers of MX might have to be reduced to accommodate a substantial number of SICBMs and a 20-submarine Trident force. Continued U.S. adherence to SALT, on the other hand, would not affect the MX. Table 7 summarizes the strategic warhead inventories with or without the deployment of the MX and with or without START limits.

Other Arguments for Terminating the MX. Even without the MX, the United States would retain some of the advantages of a triad of forces through the early 1990s, when the SICBM might be deployed, because it would still have 1,000 Minuteman missiles. These could be retained at least through the end of the century. 4/ While Minuteman missiles would theoretically be no more survivable than MX missiles in the same silos, the

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4. See U.S. Senate, Senate Armed Services Committee, DoD Authorization for Appropriations for Fiscal Year 1983, 97:2, Part 7, p. 4591.

TABLE 7. U.S. STRATEGIC FORCE WARHEAD INVENTORIES UNDER THE ADMINISTRATION'S PLAN AND UNDER ALTERNATIVES IN 1996 a/

	Without START Limits				With START Limits			
	Admin.	Alt.I	Alt.II	Alt.III	Admin.	Alt.I	Alt.II	Alt.III
Land-Based Force								
Minuteman II	450	450	450	450	0	0	0	0
Minuteman III	450	550	550	450	0	117	370	0
MX	100	0	0	100	35	0	0	35
SICBM	1,000	1,000	0	1,000	1,000	1,000	0	1,000
Bomber Force								
B-52 (cruise missile)	96	96	96	201	96	96	96	201
B-1B	100	100	100	0	100	100	100	0
ATB	132	132	132	132	132	132	132	132
Sea-based Force								
Poseidon (C-3)	8	8	8	8	0	0	0	0
Poseidon (C-4)	5	5	5	5	0	0	0	0
Trident (D-5)	19	19	20	19	19	19	20	19

a/ Assumes that the proposed START limit of 850 ballistic missiles would be increased or eliminated to accommodate deployment of the SICBM.

Soviets would still have to target them in a first strike, and could not be certain of destroying all of them. Terminating the MX would therefore not mean forgoing all the diversity and synergism inherent in the triad.

The argument that terminating the MX would weaken the U.S. hand at the bargaining table is rejected by some. They argue that unless the United States makes it clear that it would launch these missiles rather than risk their destruction in a Soviet first strike--a position the United States has avoided in the past--then the Soviets would not have a strong incentive to bargain on this point. Moreover, the U. S. program to deploy bombers, cruise missiles, the Trident II missile, and a follow-on land-based missile--all of which are unchanged in this option--might provide incentive enough.

Finally, some fear that deployment of the potent MX missile in a non-survivable basing mode could be destabilizing. In a crisis, the Soviets could not be sure that the United States was not about to launch a first strike with the large, accurate MX, even though this would be contrary to its stated policy. If they also believed that they could destroy the MX in silos in a preemptive strike, they might be tempted to launch quickly even though it would mean precipitating a nuclear war. 5/

Effects on Costs of Terminating the MX System

Terminating the MX program would mean that, in 1984 and beyond, no funds would be spent on research or production of the MX missile or on finding a way to base it. Furthermore, 1983 funds for basing research and development for the missile, which have been held up pending a final decision on the basing mode, are assumed not to be spent.

Such an alternative would offer substantial savings over the next five years and beyond, as can be seen in Table 8. In terms of budget authority, cancellation of the MX system could save approximately $17.9 billion over the coming five years. Outlays would also be reduced by about $15.1 billion over the next five years. Over the life of the program, terminating the MX would save about $18.4 billion. There would be no significant change in operating costs, because the United States would continue to operate the Minuteman missiles scheduled to be replaced by the MX.

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5. On the other hand, if the Soviets were to believe that the number of MX warheads was insufficient to present a credible first-strike threat, this concern could be diminished.

TABLE 8. SAVINGS FROM ALTERNATIVES TO THE ADMINISTRATION'S STRATEGIC PROGRAM (By fiscal year, in billions of 1984 budget authority dollars)

	1984	1985	1986	1987	1988	Total 1984 to 1988	Total 1984 to 2000
Alternative I--Cancel MX a/							
Investment	4.6	5.0	3.6	2.8	1.8	17.9	18.4
Operating	--	--	--	--	--	--	--
Total	4.6	5.0	3.6	2.8	1.8	17.9	18.4
Alternative II--Substitute Sea-based Forces for Land-based Forces a/							
Investment	4.9	4.1	3.9	2.4	4.6	19.9	41.4
Operating	--	--	--	--	--	--	19.6
Total	4.9	4.1	3.9	2.4	4.6	19.9	61.0
Alternative III--Cancel B-1B Bomber							
Investment	3.9	7.0	4.3	-1.6	-2.0	11.7	10.8
Operating	--	b/	0.1	0.4	0.6	1.1	4.8
Total	3.9	7.0	4.4	-1.2	-1.3	12.8	15.5

SOURCE: Congressional Budget Office.

NOTES: Numbers may not add to totals because of rounding. Costs do not include those funded by the Department of Energy.

a/ Savings would be higher relative to the President's January 1983 budget, which assumes an earlier, more expensive MX plan.

b/ Less than $100 million.

For consistency with recent Administration announcements, these savings are shown relative to the current MX plan. Savings relative to the President's January 1983 budget would be higher because that budget assumed an earlier, more expensive version of MX. Over the next five years, savings relative to the budget would total $27.5 billion ($22.9 billion in outlays) and $28.6 billion for 1984 and beyond.

These potential savings represent about 7 percent of total spending on all strategic force programs in the period 1984-1988. A judgment on the MX system must weigh these savings against the relative quantitative and qualitative contributions of the MX as outlined above.

Another Approach to Increasing Capability in the Near Term

The Congress could improve the capability of the ICBM force at less cost by upgrading the existing force of Minuteman III missiles. This is currently the only MIRVed ICBM in the U.S. arsenal. It could be improved to a level of capability roughly equal to MX on a warhead-by-warhead basis. An improved Minuteman III could play a part in an arms-control context similar to that of the MX.

Specifically, the guidance system developed for the MX missile--called AIRS--could be installed on Minuteman III missiles instead. Taken together with the installation of the Mk12A warhead on 250 more Minuteman IIIs (300 missiles carry it now), the upgraded Minuteman warheads would have the same accuracy and yield as those planned for installation on the MX. The Air Force estimates that the cost to complete this plan for 550 Minuteman IIIs would be approximately $14 billion. This would compare with the $18.4 billion cost of deploying 100 MX in silos.

At first glance this plan would also appear to provide roughly 50 percent more pre-attack, prompt hard-target-capable warheads than would deployment of MX missiles in silos. DoD officials have indicated, however, that a warhead--in some cases, two--would have to be removed from certain missiles to compensate for the increased weight of the heavier Mk12A warheads and AIRS guidance set. 6/ Even so, the upgraded Minuteman force might then provide at least the same number of pre- and post-attack war-

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6. See U.S. Senate, Senate Armed Services Committee, DoD Authorization for Appropriations for Fiscal Year 1983, 97:2, Part 7, p. 4222.

heads as 100 MX missiles. It might not have the same targeting flexibility, however, thus limiting the options for its use. 7/

According to the Air Force, upgrading the Minuteman force would take longer than deploying the MX. Whereas the force of 100 MX in silos would probably begin deployment in 1986 and be in place around 1988, the Minuteman upgrade would not begin deployment until five years after a decision to start the program and would not be completed until roughly four years later. A fiscal year 1984 decision would, therefore, see the upgraded force in place around 1993.

Funds spent to upgrade the Minuteman would not garner all of the qualitative benefits of deploying the MX: they would not open a missile production line or make the larger missile available in case conditions warranted. They would, however, add a quantitative capability that would be at least comparable to deploying the MX in silos, and at somewhat lower cost.

ALTERNATIVE 2: FORGO MODERNIZATION OF LAND-BASED MISSILES AND RELY INSTEAD ON ADDITIONAL SEA-BASED FORCES

In addition to deploying 100 MX missiles in Minuteman silos, the Administration proposes further modernization of the land-based missile force, perhaps by deploying additional MX missiles in a more survivable basing mode or by introducing a small ICBM that would be mobile enough to survive. A survivable land-based missile would offer the important qualitative and quantitative advantages inherent in a triad of forces each able to survive a Soviet first strike.

Unfortunately, the history of the last decade suggests that it will be very difficult to design a survivable land-based missile that will meet domestic environmental and security concerns and be reasonable in price.

The alternative discussed below proposes to terminate further investment in land-based missiles beyond some limited research and development, assumed to amount to a few million dollars a year. It would keep the 1,000 existing Minuteman missiles, but would not deploy the MX or any follow-on land-based missile. Instead, it would build more Trident submarines, armed

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7. Flexibility is indicated by missile "footprint"--the area over which it is feasible for a MIRVed missile to deliver its warheads--as well as missile range and throwweight.

with the new Trident II (D-5) missile. By substituting submarines for land-based missiles, this alternative would attain the same or better capabilities by many quantitative measures at less cost. But it would not offer all the qualitative advantages of a survivable triad.

Reasons for Accepting the Administration's Proposal

Maintaining a Survivable Triad. Those who favor development of a follow-on land-based missile see it as essential in enabling the United States to maintain a triad of strategic offensive forces, each able to survive a Soviet first strike. Since a substantial portion--perhaps up to 95 percent--of the Minuteman force is predicted to become vulnerable to a Soviet first strike within the next few years, a survivable follow-on missile would be needed to maintain a survivable triad.

A survivable triad would provide insurance against technological breakthroughs that, if they occurred rapidly and without time for development of countermeasures, could jeopardize U.S. retaliatory capability. A triad of forces also requires the Soviets to spread their defensive research efforts over three different groups of weapons systems, reducing the chance of a breakthrough against any one. Abandoning the quest for survivable land-based missiles would mean forgoing these advantages.

Other advantages that would be forgone have been noted earlier in this chapter. These include reliable command and control, accuracy, and targeting flexibility. Also noted earlier is the potential contribution of such a program to the arms-control process: its indication of U.S. steadfastness of purpose, providing an incentive to the Soviets to conclude an arms-control agreement.

Quantitative Contribution. A survivable follow-on missile could add a substantial number of surviving warheads able to destroy targets hardened against nuclear blast. They could be launched promptly after a Soviet first strike. As with the MX missile, the contribution of a follow-on missile to survivable, prompt, hard-target kill capability would depend on what other systems could act "promptly." If only land-based missiles are assumed to provide this capability, then a follow-on missile such as the SICBM would offer nearly 90 percent of U.S. surviving prompt, hard-target kill weapons, assuming that most existing Minuteman and MX silo-based missiles would have been destroyed. On the other hand, if Trident submarines with the D-5 missile were also available, then by 1996 a follow-on land-based force that provided 600 surviving warheads would contribute between 17 and 34 percent of surviving U.S. prompt, hard-target capability, depending upon

whether the Soviet first strike occurred after some warning or as a bolt out of the blue.

Future Vulnerability of Submarines. Under the proposed alternative, the United States would be concentrating more of its strategic deterrent in the submarine force. Even though submarine-based missiles are thought by many to be invulnerable through the 1990s, there can be no absolute certainty of it.

Reasons to Forgo Further Modernization of Land-Based Missiles

Despite the advantages of a survivable land-based missile force, the problems associated with achieving one are formidable. These difficulties may be illustrated by a discussion of the problems associated with one possible follow-on missile, a small ICBM deployed in a mobile mode.

The rationale of a mobile system is to make the location of the missiles uncertain. This would force the Soviets to barrage large areas with nuclear weapons in order to defeat the system, thus complicating their targeting problem and requiring them to dedicate a much larger percentage of their missile force to the attack. This contrasts with the current situation in which there is a high probability that one or two Soviet warheads targeted on a fixed silo could destroy a multiple-warhead ICBM.

One problem is that mobile systems are inherently costly, mostly because of the large numbers of specialized transporter vehicles and numbers of personnel required to man the system. For example, the Department of Defense estimates that the cost of developing and deploying a force of 1,000 SICBMs in a land-mobile mode would be $46.2 billion. Annual operating costs would be approximately $3 billion. The estimates are subject to certain decisions and technical findings not yet available, notably the land area that would be available for deploying the missiles and the degree to which the transport vehicles could be hardened against nuclear blast. Substantial limits on either of these could raise the costs of achieving the desired level of survivability. The absence of effective arms-control limitations could drive the costs needed to maintain a given level of survivability still higher, because the Soviets could deploy more weapons to attack the system.

Nor is cost the only problem. Air Force officials have indicated that 1,000 single-warhead SICBMs would be needed to replace the previously planned MX in closely spaced basing. They have also indicated that there may not be enough land on government installations to base such a system safely. In this case, it might be necessary to include areas outside govern-

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ment installations, with all the attendant concerns regarding adequate security and public acceptance. (See Appendix A for a discussion of some considerations for mobile systems.)

Certain desirable attributes of a land-based system might be diminished with a land-mobile basing mode. For instance, some reliability in command and control might have to be sacrificed for the ability to roam around freely in an unpredictable fashion; some promptness might have to be yielded if missiles must remain stationary for a time in order to align their guidance systems before retaliating; and survivability, owing to the uncertain location of the missiles, might suffer if many missiles were kept in garrison or had to be moved to pre-surveyed sites in order to launch. Issues such as these become very relevant when the argument for deploying such a system rests heavily on the assertion that it is necessary in order to preserve the attributes of a survivable land-based system.

Other Arguments for Terminating Further Investment in Land-Based Missiles

Even without modernization of the land-based triad leg, the United States would retain its 1,000 Minuteman missiles, with 2,100 warheads, through the end of this century at least. This means that even without a survivable follow-on missile the United States would retain enough of the diversity and synergism of the triad to complicate Soviet attack plans. For example, as the President's Commission on Strategic Forces pointed out, a Soviet ICBM attack on the U.S. land-based missile force would, because of the 30-minute flight time involved, alert the bomber force and allow a substantial portion of it to escape. Likewise, a Soviet attack on U.S. bomber bases with submarine-launched missiles would provide time to launch U.S. land-based missiles before the later arrival of Soviet ICBMs.

The argument that a follow-on missile would contribute to negotiations on arms control is not convincing to everyone. Deployment of a SICBM would not begin until the early 1990s, and near-term modernization would, in this view, probably be of more concern to the Soviets.

Submarines as an Alternative.

Unlike the problematic land-based systems, strategic submarines offer relatively certain capabilities. The Trident II (D-5) submarine-launched ballistic missiles (SLBM), which will enter operation by 1989, will have a capability to destroy hardened targets almost equalling that of the best land-based missiles. The Trident II will be deployed on Trident submarines,

which are widely considered invulnerable when at sea and are likely to remain so at least through the 1990s.

Rather than pursuing further modernization of the land-based leg of the triad, the Congress could decide to rely on the Minuteman force to retain some of the advantages of a triad, while expanding the Trident submarine fleet to achieve the level of effectiveness--in terms of surviving hard-target-capable warheads--that would have been provided by the follow-on missiles.

The number of Trident submarines that would be needed depends on the measure used to determine equivalence. This study assumes the follow-on missile system would have provided about 600 surviving, hard-target warheads. Five Trident submarines armed with Trident II missiles would provide approximately the same number of surviving hard-target warheads under an attack-without-warning scenario, assuming that only the force on patrol survived. 8/ If, on the other hand, equivalence is measured in terms of hard-target warheads available for prompt retaliation, then it would take nine additional Trident submarines (beyond the assumed force of 20) to provide the requisite number of surviving warheads. This is because more submarines would have to be continuously at sea in order to have 600 warheads available promptly under current operating conditions. It would be possible, however, to operate the Trident fleet in a way that would reduce the number of submarines needed. 9/

Five to nine additional Trident submarines could be produced using existing shipyard capacity. This assumes that Trident submarines would be procured at the rate of three every two years, rather than one per year as the Administration plans, with a revised 25 to 29 vessels rather than the goal of 20 assumed for the Administration plan. 10/ The Congress might not

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8. This assumes about 74 percent of the on-line Trident submarines are at sea on a day-to-day basis.

9. U.S. SSBNs currently operate so that approximately 50 percent of those at sea are constantly on a prompt alert status, ready to recieve a launch order and to execute it promptly. But it would also be possible to operate an additional group of Trident submarines as a force dedicated to the role of providing prompt counterforce retaliatory capability. These submarines would all be on prompt alert status. If such an approach was taken, the number of Trident submarines needed would decrease once again to five.

10. The Navy has indicated that authorizing three submarines every two years would be the preferred rate for an increased production schedule

authorize the first additional submarines under this alternative until fiscal year 1985, primarily because of long lead times for nuclear reactor components. Deliveries would then begin in 1991 at the accelerated rate of three submarines every two years. Deliveries of five additional submarines above the baseline goal of 20 would be complete by 1999, and delivery of nine by the year 2002. This might be somewhat longer than the time required for a follow-on land-based missile, which would be initially deployed, under Administration plans, in the early 1990s, but probably not fully deployed and fully survivable until the mid-1990s or later. The difference in availability between the two systems would be small for a requirement of five Tridents, and somewhat greater for the complement of nine Tridents.

Savings from Choosing the Alternative

Choosing the alternative would be likely to save money both in the long run and in the next five years. A force of five additional Trident submarines with Trident II (D-5) missiles would cost about $12.8 billion to build and an additional $6 billion to operate for 20 years, for a total of $18.8 billion. With nine additional Tridents, investment costs would rise to $23.1 billion and 20-year operating costs to $10.8 billion, for a total of $33.9 billion.

Land-based missiles are likely to be more expensive than additional Tridents. The costs of deploying 100 MX missiles in silos in 1984 and beyond would amount to $18.4 billion. It is difficult to determine the costs of the follow-on missile system until it is more fully defined. But both the investment and the operating costs of any mobile system would be substantial. A mobile system would be expensive to build and operate because of the large numbers of missiles, transporters, personnel, and support facilities required. The Department of Defense estimates for the costs of a land-mobile system of 1,000 SICBMs cited earlier would yield a 20-year life-cycle cost of $107 billion. Taken together, the life-cycle costs of the MX and small ICBM would exceed those of nine additional Tridents by a factor of more than three.

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for Trident submarines. It has also noted that production capability could be built up over a three-year period to a rate of two submarines per year with no adverse effect on the Administration's planned SSN-688 attack submarine program.