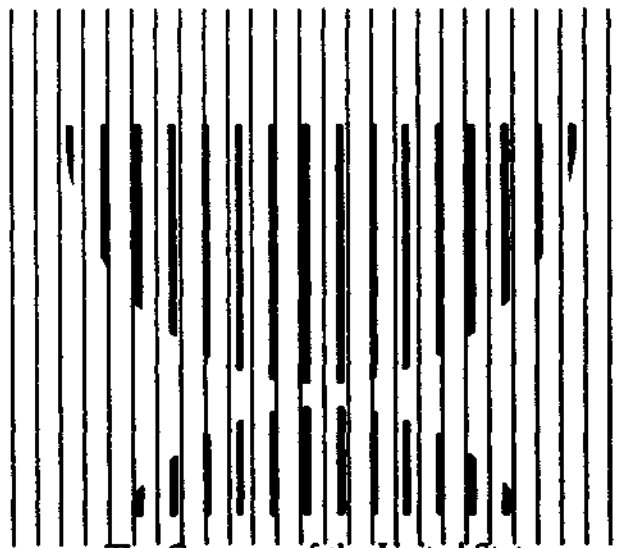


CBO STAFF MEMORANDUM

**BUDGETARY AND MILITARY EFFECTS
OF THE STRATEGIC ARMS
REDUCTION TALKS (START) TREATY**

February 1990



The Congress of the United States
Congressional Budget Office



**THE CONGRESS OF THE UNITED STATES
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The United States and the Soviet Union are currently negotiating the Strategic Arms Reduction Talks (START) treaty. This Staff Memorandum summarizes an analysis of the costs and military effects of the U.S. version of the treaty. The analysis was prepared by the Congressional Budget Office (CBO) at the request of the ranking minority member of the Senate Budget Committee. In keeping with CBO's mandate to provide nonpartisan analysis, this memorandum contains no recommendations.

The memorandum was prepared by Bonita J. Dombey under the general supervision of Robert F. Hale and John D. Mayer. The author wishes to acknowledge the costing assistance of Raymond J. Hall and William P. Myers of CBO's Budget Analysis Division and the assistance of Michael O'Hanlon of CBO's National Security Division. The author also wishes to thank David Mosher who did much of the early work for the project while a summer intern with the CBO. Rhonda L. Wright prepared the Staff Memorandum for publication.

INTRODUCTION AND SUMMARY

This memorandum summarizes an analysis of the costs and military effects of the proposed Strategic Arms Reduction Talks (START) treaty currently being negotiated by the United States and the Soviet Union.¹ The proposed treaty would limit the total number of strategic warheads in various categories that each country could deploy. For the most part, however, the treaty would not limit production or deployment of particular weapon systems. Thus, by altering the number of older systems that are retired, the United States could accommodate the proposed START treaty while pursuing varying amounts of modernization of strategic offensive forces.

The choice of how to respond to the proposed treaty could depend not only on the treaty but also on broader policy considerations, including budgetary limitations and future trends in military relations between the United States and the Soviet Union. To illustrate the effects of a range of possible responses to the treaty, this memorandum examines three possible U.S. responses. The United States could:

- o Continue maximum modernization of strategic forces;
- o Seek a balanced, cheaper triad of strategic forces; or
- o Pursue minimum modernization.

1. Details of this analysis will be contained in a forthcoming CBO Paper analyzing alternative military force structures.

Key Findings

Depending on the option chosen, this memorandum finds that long-run cost savings in a typical year could range from \$3 billion to as much as \$12 billion. (Savings are expressed in 1990 dollars of budget authority and are relative to spending on analogous systems in 1990.) The savings in any particular year would depend on decisions about specific weapon systems that are not analyzed in this memorandum.

All of the options would probably maintain the rough parity in the total number of strategic warheads that exists today between the United States and the Soviet Union. But the total number of warheads would be lower, probably by about one-quarter, for the United States.

The number of U.S. warheads that would be likely to survive a Soviet nuclear attack would decrease under these options. Depending on the nature of the attack and the option, reductions could be over 35 percent compared with today's levels. Surviving warheads are important because they measure the ability of the United States to retaliate after a Soviet attack. The U.S. ability to retaliate, one hopes, would deter the Soviet Union from attacking.

While fewer warheads would survive under all of the options, the United States would still have thousands of warheads available for retaliation after an attack. Regardless of the option and even under the most stressful type of attack, at least 2,900 warheads would be likely to survive. In most cases, the number of surviving

warheads would exceed the number that would have survived a Soviet attack in 1982, before the effects of the recent buildup in strategic forces.

PROPOSED START TREATY

The START treaty is still being negotiated. Where issues are in contention in the negotiations, this analysis assumes that the U.S. proposals are accepted. Under the overall limits that have been agreed to, each country would be allowed no more than 6,000 strategic nuclear warheads on 1,600 delivery platforms (strategic nuclear delivery vehicles). In addition, there would be various sublimits on warheads.

TABLE 1. PROVISIONS OF PROPOSED START TREATY

Limits

Total accountable warheads	6,000
Strategic nuclear delivery vehicles	1,600
Ballistic missile warheads	4,900
ICBM warheads ^a	3,300
Heavy ICBM warheads (SS-18 type)	1,540

Special Counting Rules

Penetrating bombers count as one warhead
Bombers carrying cruise missiles count as 10 warheads^a
Seventy-two submarine-based launchers in overhaul do not count^a

SOURCE: Congressional Budget Office based on U.S. government sources.

NOTE: Limitations on sea-launched cruise missiles are not being considered in the START negotiations; therefore, SLCMs are not considered in this analysis.

a. U.S. proposal apparently not yet accepted by the Soviet Union.

Moreover, some weapons that deliver warheads would not be counted, or would be counted only partially, under the treaty. For example, bombers designed to penetrate enemy airspace would count as carrying only one warhead, even though they would actually carry a number of warheads. Also, up to 72 launchers on submarines in overhaul would not be counted under the U.S. version of the START treaty. Table 1 on page 4 shows the specific assumptions about the treaty that the Congressional Budget Office (CBO) used in its calculations in this memorandum.

OPTION I: CARRY OUT THE TREATY BUT MAXIMIZE MODERNIZATION

Under one approach to carrying out the START treaty, the United States could accommodate the various limits on warheads imposed by the treaty by retiring older

TABLE. 2 DETAILS OF OPTIONS
(In numbers of systems)

	1990 Level	Alternatives with START		
		Maximum Modernization	Cheaper, Balanced Triad	Minimum Modernization
Planned Systems or Those Now in Production				
Rail MX	0	50	50	0
SICBM	0	500	250	0
Trident Submarine	11	23	20	17
B-2 Bombers	0	132	66	15
Systems No Longer in Production				
Silo-Based MX	50	0	0	50
Minuteman III	500	0	295	500
Minuteman II	450	0	0	0
B-1 Bombers	97	97	97	97
B-52 Bombers	186	0	0	23
Poseidon Submarines	23	0	0	0

SOURCE: Congressional Budget Office.

strategic systems and by continuing to pursue a full program of modernization. This option would be consistent with the view that, if strategic systems are to be fewer in number, those remaining should be as modern as possible.

Under this option, the United States would buy all of the strategic systems it now plans to buy in substantial numbers. These would include 50 Rail MX missiles, 500 Small Intercontinental Ballistic Missiles (SICBMs), 23 Trident submarines, and 132 B-2 bombers (see Table 2 on page 5). To comply with the START limits, the United States would retire older strategic systems as the new systems entered the inventory. Retired systems would eventually include all of the Poseidon submarines, B-52 bombers, and Minuteman land-based missiles.

TABLE 3. LONG-RUN SAVINGS OF OPTIONS
(In billions of 1990 dollars)

	Maximum Modernization	Cheaper, Balanced Triad	Minimum Modernization
Procurement	a/	3	6
Operating Direct/indirect	2	5	6
Total	3	8	12

SOURCE: Congressional Budget Office.

NOTE: Numbers may not add to totals due to rounding.

a. Less than \$400 million.

Budgetary Savings

Under Option I's approach to carrying out the START treaty, average annual costs to buy and operate these systems would eventually total about \$3 billion less than the costs to buy and operate analogous systems in 1990 (see Table 3 on page 6). Savings include reductions in procurement costs and in direct and indirect operating costs.² But virtually all of the savings under this option would come from reduced operating costs associated with smaller strategic forces. Because of the aggressive program of modernization assumed under this approach, average savings for procurement would be modest.

Long-run savings could rise to a total of \$4 billion a year when overhead reductions are included. (See Table A-1.) Overhead costs--which include portions of costs for activities such as headquarters, the training establishment, and the operation of military bases--are often assumed not to vary with relatively small changes in the number of forces. Thus, they might not vary under the options in this memorandum since they mostly alter the mix of strategic forces. However, overhead costs may vary if reductions in strategic forces to accommodate the START limits are made along with reductions in other military forces as a result of the treaty on Conventional Forces in Europe (CFE) or the general lessening of

2. Direct operating funds pay for the personnel and operating costs of a particular military unit or weapon system. Indirect funds pay for combat support that is not part of the unit or system, as well as for portions of the training, medical care, repair facilities, and other support needed by the unit or system.

military tension. In the context of large overall force reductions, the overhead reductions associated with these cuts in strategic forces might be realized.³

The reader should view savings for this option, and for other options in this memorandum, as long-run estimates that apply in a typical year after all older forces have been retired and new systems have taken their place, and after procurement programs have been adjusted to accommodate the new forces. While savings reflect reductions in operating and procurement costs, they do not reflect the added costs of verifying the START treaty, which cannot yet be estimated with confidence.

Effects on Military Capability

This approach to the START treaty would probably maintain the rough parity in the number of strategic warheads that exists today between the United States and the Soviet Union, but at a lower level. Today, the United States and the Soviet Union have about 11,800 and 11,000 on-line warheads, respectively--or close to a one-to-one ratio. (On-line warheads include all warheads in the inventory less those whose delivery vehicles are in the maintenance pipeline or in overhaul.) After all systems assumed under this option are fully in place, the United States and the Soviet Union might have about 8,900 and 7,700 on-line warheads, respectively.⁴ Thus, the ratio of warheads would still be close to one to one, but the total number of U.S. warheads would be about 25 percent smaller than it is today.

3. For details of CBO's assumptions regarding overall force reductions and reductions in overhead costs, see forthcoming CBO Paper analyzing alternative military force structures.

4. For this calculation of Soviet warheads, and for others in this memorandum, CBO assumes that the Soviet Union responds to the START treaty by retiring older systems and continuing its ongoing modernization programs.

Because of the uncertainty created by the START counting rules, the preceding analysis should be viewed only as a rough guide. As was noted earlier, the rules count warheads on penetrating bombers only partially and exclude all warheads on some submarines in overhaul. Therefore, the number of warheads and the resulting ratios could vary considerably if, for example, the Soviet Union decided to expand its bomber force greatly or if the United States decided to limit its bomber force. Nevertheless, neither country would be likely to implement the treaty in a manner that sacrificed the current rough numerical parity in total warheads.

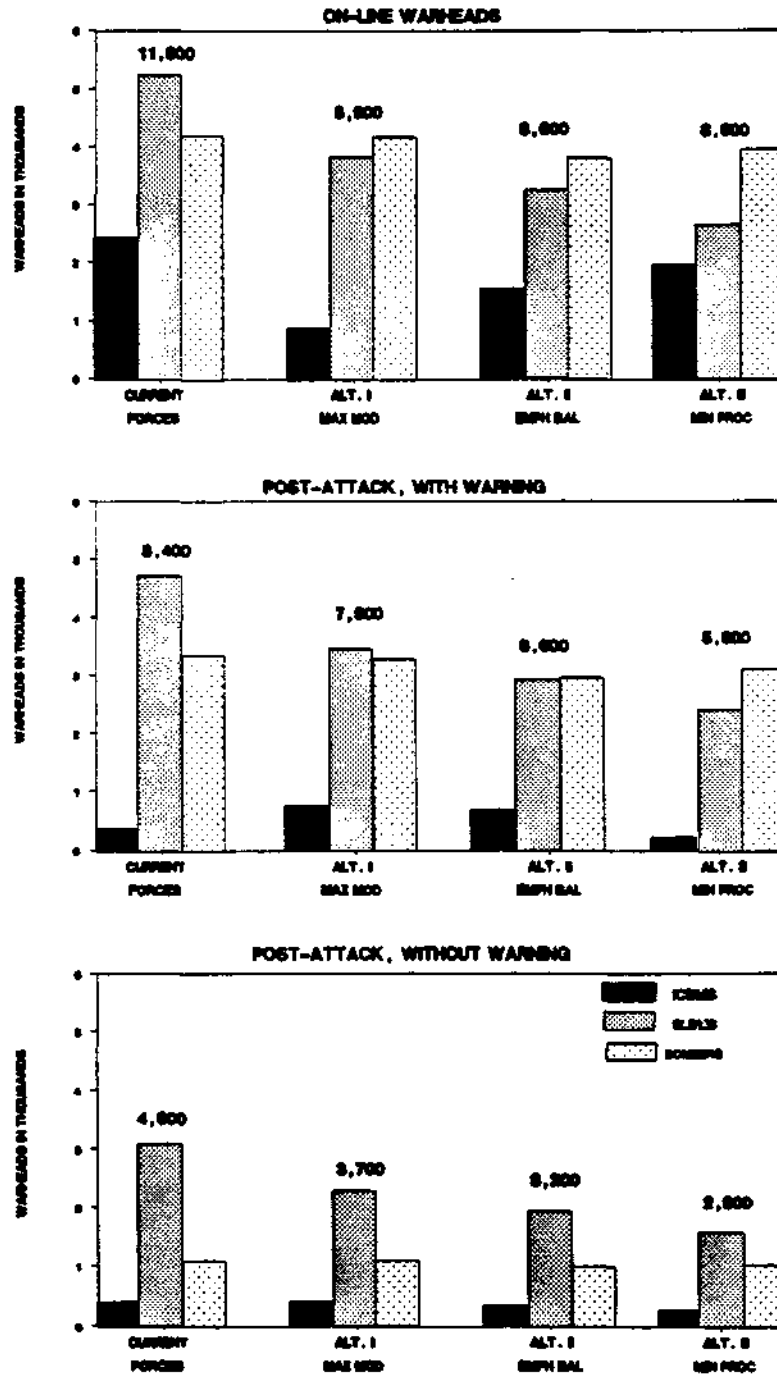
The counting rules also explain why START would reduce total U.S. warheads by only about 25 percent rather than the 50 percent reduction often associated with it. The 50 percent reduction applies to warheads accountable under START; the 25 percent applies to available (on-line) warheads.

Under this approach to carrying out START, about 7,500 U.S. warheads would be likely to survive a Soviet nuclear attack that occurred after sufficient warning that U.S. forces were brought to a wartime posture.⁵ This is a reduction of about 11 percent compared with the 8,400 that would survive if such an attack occurred in 1990 (see Figure 1). The number of Soviet targets may also decrease, though perhaps not in proportion to the decline in surviving U.S. warheads. Targets associated with Soviet strategic forces would decrease as the Soviet Union carries out START. But numbers of other targets, such as leadership shelters and

5. Both countries are considering options to restrict the deployment areas of mobile ICBMs. Such restrictions could reduce the expected survivability of the SICBM, particularly in a scenario in which a Soviet attack occurred without advance warning. The survivability of the SICBM could become similar to that of the Rail MX.

FIGURE 1.

**DISTRIBUTION OF STRATEGIC TRIAD:
CURRENT FORCES AND
ALTERNATIVES UNDER START**



SOURCE: Congressional Budget Office.

NOTE: Estimates for the alternatives assume that all changes in the force structure are fully in effect. For some systems, this would not occur until after the year 2000.

command and control centers, have been increasing in the recent past and could continue to do so. Hence, after START, a retaliatory strike by the United States might be able to destroy a somewhat smaller proportion of Soviet targets than would such a strike today. Some analysts might argue that this would reduce U.S. ability to deter the Soviet Union from attacking.

Nevertheless, even assuming the reductions in U.S. forces under this option, the United States would have about 7,500 surviving warheads after an attack that occurred with sufficient warning to permit U.S. forces to prepare for it. This number of warheads would be substantial and would represent about 34 percent more warheads than would have survived had such an attack occurred in 1982 (see Figure 2).

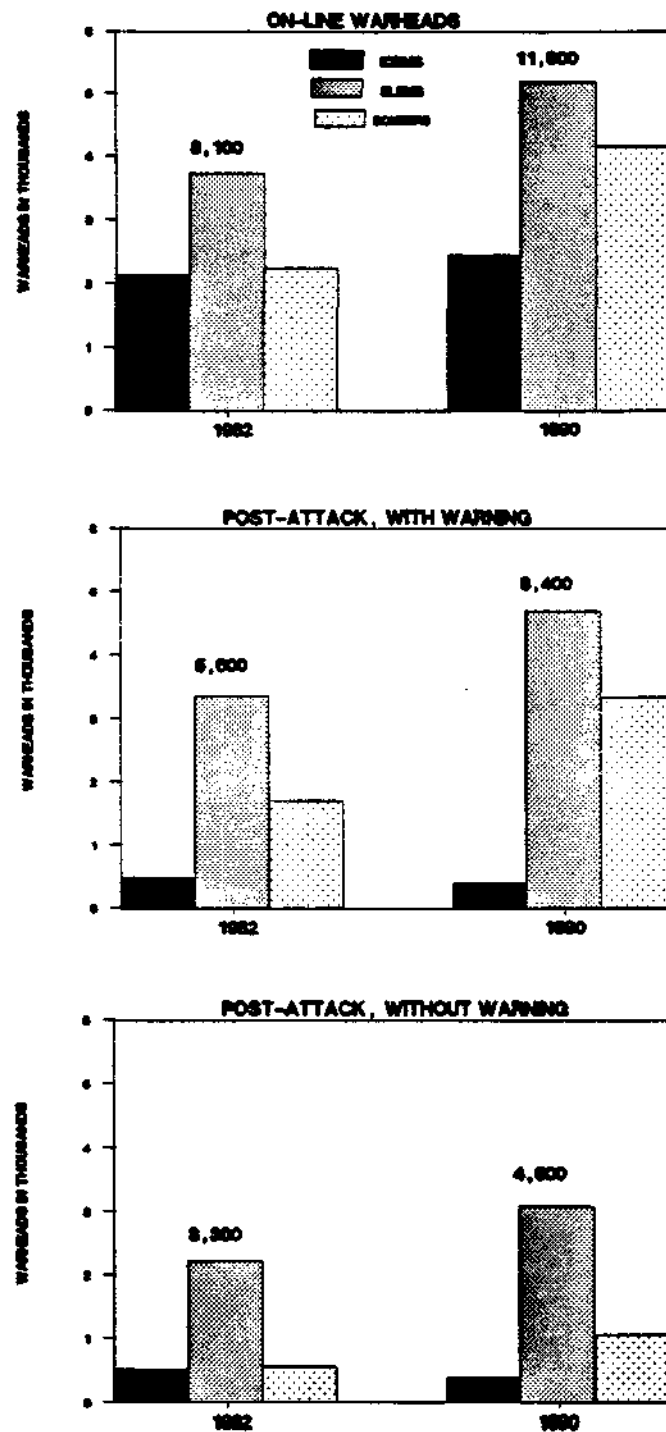
In addition to changes in quantitative measures, this maximum-modernization approach to carrying out the proposed START treaty would create a highly modern U.S. strategic force. The force would contain systems such as the B-2 bombers, designed to avoid Soviet radars, and SICBMs designed to disperse widely to avoid destruction during a Soviet attack.

OPTION II. SEEK A BALANCED, CHEAPER TRIAD

In view of political changes that may make the world less threatening, as well as pressures to reduce the deficit, the United States could respond to the START treaty by seeking a balanced and cheaper triad of strategic forces. Specifically, this option would buy 50 Rail MX missiles, 250 SICBMs, 20 Trident submarines, and 66

FIGURE 2.

**DISTRIBUTION OF STRATEGIC TRIAD:
1982 AND 1990**



SOURCE: Congressional Budget Office.

B-2 bombers--fewer in most cases than were purchased under the maximum-modernization option. To remain at the numerical ceilings for total warheads, 295 of the older Minuteman III land-based missiles and 97 B-1 bombers would be retained.

Budgetary Savings

Long-run savings would eventually amount to \$8 billion compared with the costs for analogous systems in 1990. Savings reflect reductions in procurement (\$3 billion) and in direct and indirect operating costs (\$5 billion). Long-run savings could rise to \$10 billion a year when overhead reductions are included.

Effects on Military Capability

As for capability, this option would maintain about 8,600 on-line warheads, a number likely to maintain today's rough numerical parity with the Soviet Union. Warheads likely to survive a Soviet attack with advance warning would be fewer in number under this approach than the number that would survive today (by about 22 percent) or the number that would survive under the maximum-modernization approach (by about 12 percent). The number of surviving warheads would be smaller because this option relies more heavily on land-based missiles in fixed silos, and these weapons are likely to be destroyed during a Soviet attack.

Surviving warheads would, however, continue to match or exceed the number that would have survived in 1982 (see Figure 2). Moreover, under this option,

surviving warheads would be somewhat more evenly balanced among the three legs of the strategic triad (land-based missiles, submarines, and bombers) than is the case with current forces (see Figure 1). This shift toward more balance may contribute to the deterrence of nuclear war by limiting the potential damage that could be caused by a Soviet technological breakthrough that threatened one of the three triad legs.

OPTION III. CARRY OUT THE TREATY BUT MINIMIZE MODERNIZATION

Finally, the United States could respond to the proposed START treaty in a way that would be likely to maintain rough numerical parity in total warheads but would hold down costs by minimizing further modernization. Specifically, the United States might decide not to buy any new strategic systems beyond those already purchased. That would mean no Trident submarines (beyond the 17 already under contract), no rail MX missiles, no SICBMs, and no B-2 bombers (beyond the 15 already under contract). To remain at the numerical ceilings established by the proposed treaty, the United States would retain 500 of the older Minuteman III missiles, 23 older B-52H bombers, and 97 B-1 bombers.

Budgetary Savings

This approach would result in long-run average savings of about \$12 billion a year compared with the 1990 level of spending. Savings would include reductions in procurement, averaging \$6 billion a year, plus direct and indirect operating savings,

averaging another \$6 billion a year. Long-run savings could rise to \$16 billion a year when overhead reductions are included.

Effects on Military Capability

The total number of available on-line warheads would be about 8,600 under this approach, which would probably maintain a rough numerical parity with the Soviet Union. But warheads likely to survive a Soviet attack would fall to the lowest level under all of the approaches outlined in this memorandum.

In the most stressful situation for U.S. forces--a Soviet attack that occurred without advance warning--surviving warheads would fall to a level 37 percent below the current level and 23 percent below the level under the maximum-modernization approach. There would be 13 percent fewer surviving warheads than would have survived after such an attack in 1982 (see Figures 1 and 2). This decrease in the expected number of surviving warheads occurs largely because the entire ICBM force would be based in silos that would be vulnerable to a Soviet attack unless launched before Soviet missiles arrived, and because the Soviets are assumed to continue improving their missiles' accuracy and reliability so that the survivability of the U.S. silo-based ICBMs would be expected to decline even further over time. However, even after such an unexpected attack, the United States would still have about 2,900 surviving warheads to use in retaliation under this option.

In the less stressful and more likely case of a Soviet attack that occurs after some warning, the United States would have 32 percent fewer surviving warheads

than would survive today and 23 percent fewer than under the maximum-modernization approach. But the 5,800 surviving warheads would represent a substantial capability--about the same as the 1982 level.

Under this approach, the United States would rely on significantly older strategic forces than in the previous options. Relying on older forces may mean accepting reduced flexibility and effectiveness in attacking certain types of Soviet targets--such as targets super-hardened against nuclear effects or well-defended targets. Older forces, particularly the bomber force, may also be less survivable in their retaliatory mission, which is not reflected in the above counts of warheads surviving a Soviet attack. Finally, at some point some older weapon systems may require life-extending modification programs, such as reskinning the wings of the B-52 bombers. Additional costs for this purpose, however, are not likely to be incurred until well beyond the year 2000.

TIMING OF SAVINGS

The estimates of savings in this memorandum represent long-run estimates that would be realized in a typical future year after all the changes in forces and systems were in effect. How quickly the savings would be realized depends on which option is chosen and how rapidly the changes are made.

Under the maximum-modernization approach, for example, it might be several years before even the fairly modest cost savings would occur. Indeed, costs could actually increase for the next few years. Under this approach, expensive procure-

ment programs that are now in their early stages would continue. Only after the new systems are purchased and enter the inventory, and older systems are retired, would operating savings gradually be realized.

In contrast, substantial savings could occur immediately under the approach that carries out START with minimum modernization. Under that option, programs requiring large expenditures over the next few years, including the B-2 bomber, would be canceled.

APPENDIX A

LONG-RUN SAVINGS OF ALTERNATIVES

WITH REDUCTIONS IN OVERHEAD

TABLE A-1. LONG-RUN SAVINGS OF ALTERNATIVES INCLUDING OVERHEAD (In billions of 1990 dollars)

	Maximum Modernization	Cheaper, Balanced Triad	Minimum Modernization
Procurement	a/	3	6
Operating Direct/indirect	2	5	6
Subtotal	3	8	12
Overhead	1	3	4
Total	4	10	16

SOURCE: Congressional Budget Office.

NOTE: Numbers may not add to totals due to rounding.

a. Less than \$400 million.