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Optimizing the Post-START US Strategic Nuclear Force Mix

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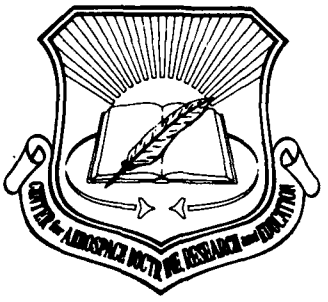

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Optimizing the Post-START US Strategic Nuclear Force Mix

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ABSTRACT

The United States and the Soviet Union have been negotiating Strategic Arms Reduction Talks (START) since 1981. This agreement will result in major reductions in the strategic nuclear forces of both countries. The balance between the three legs of the Triad (the number of intercontinental ballistic missiles compared with the number of bombers and the number of submarine-launched ballistic missiles) will become increasingly important.

This paper examines the current as well as a proposed post-START force mix, the effect this treaty will have on existing forces, and the changes in targeting priorities. The proposed force mix would require major changes in only the intercontinental ballistic missile leg of the Triad. The submarine-launched ballistic missile and bomber legs would need minimal changes.

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CHAPTER 1

Introduction and Background

THE UNITED STATES and the Soviet Union began negotiating the Strategic Arms Reduction Talks (START) in 1981. During this period the two countries have overcome several obstacles toward reaching an agreement. It is now the opinion of most experts that START will soon be signed by the superpowers. Because of the likelihood of a START agreement becoming a reality, it is necessary to evaluate current strategic force postures, capabilities, objectives, and missions in order to postulate what type of force the United States must form in a post-START era. This paper attempts to develop a post-START force mix that will meet most of the objectives and missions necessary to ensure the national security interests of the United States.

This formulation and justification of a balanced post-START force mix begins with a review of US strategic doctrine and objectives. Next is a review of the current order of battle (OB) of US and Soviet strategic forces. A brief summary of the START limits and debate, as reported in the public press, follows. Finally, a post-START force mix that can reasonably be expected to meet the objectives of US national security concludes the paper. Although it has recently become clear that the money managers will have a big say in what shape the military will take and what roles and missions it will perform, this paper examines the issues and makes recommendations based on military value, unconstrained by budgetary considerations.

Force mix is used here to mean the number and types of weapon systems which comprise the three legs of the Triad. The Triad is made up of a mix of intercontinental ballistic missiles (ICBM), submarine-launched ballistic missiles (SLBM), and bombers equipped with nuclear gravity bombs and air-launched cruise missiles (ALCM). The term *deterrence* as used here, includes the concept of extended deterrence whereby the United States forces are positioned, planned, and structured in such a manner as to deter aggression against the US and its allies.

There exists a wide disparity of opinions on what type of post-START force is in the best interest of the United States. There are even those who feel that the consummation of START will not be in the best interest of the US because it will create forces (both US and Soviet) which will emphasize multiple-warhead missiles and thus create a disparity between numbers of warheads and launchers which in turn could tempt each side to try to destroy the other's arsenal before it can be launched.[1]

Aside from the issue of force reductions associated with START, there is much criticism of each leg of the US Triad usually by members of one of the other legs of the Triad. The criticism centers on the respective value of each leg with regard to its contribution to national security as well as its costs, vulnerabilities, and effectiveness. The following depicts the major criticisms regarding the value of each leg of the US Triad.

1. Intercontinental ballistic missiles placed in silos are extremely vulnerable.

They also have a large number of warheads which makes them attractive targets for Soviet planners. The Soviets could conceivably eliminate the 10 silo-based warheads on a single Peacekeeper missile with only two reentry vehicles (RV) of their own. This can create an attractive RV exchange ratio.

2. Submarine-launched ballistic missiles may become vulnerable to Soviet antisubmarine warfare (ASW) forces. Since modern nuclear ballistic submarines (SSBN) carry a large number of warheads, it is conceivable for the US to lose a disproportionately large percentage of its strategic nuclear forces if only one SSBN is lost to Soviet ASW forces.[2]

3. Bombers are vulnerable to attack while on the ground as well as to surface-to-air missiles (SAM) while in flight. Bombers are soft targets that can be eliminated either on the ground or in the sky by a relatively inaccurate SLBM. Since SLBMs have a short flight time, there would be little alert and escape time for the aircraft.

4. Multiple independently targetable reentry vehicles (MIRV) can contain several warheads on one missile. This arrangement is destabilizing since it results in fewer missiles (i.e., targets for the Soviets to attack) and correspondingly more vulnerability to preemptive strike. A single warhead ICBM would, by this same argument, be much more of a stabilizing asset because it would be harder to successfully preempt.[3]

With the strong arguments by each proponent of each area presented previously, it becomes obvious that some balance of forces must be achieved in order to maximize the benefits of each type of weapon while at the same time reducing the potential drawbacks of each. It is the purpose of this paper to postulate the plausible parameters, including numbers and types of weapons, of such a balanced post-START US strategic force mix.

US Strategic Doctrine and Objectives

American doctrine regarding the use of nuclear weapons has evolved now for about four decades. Technological changes in weapons and delivery systems have resulted in changes in employment policies. To get to the source of the requirement for US strategic weapons doctrine one must review statements of national interest and objectives. The latter is found in the *Fiscal Year 1989 Annual Report to Congress* made by Secretary of Defense Frank C. Carlucci:

> America's preeminent national security interest is the survival of the United States as a free and independent nation, with its fundamental values and institutions intact, and its people secure. We also seek to promote the growth of freedom, democratic institutions, and free market economies throughout the world, linked by fair and open international trade. More specifically, we support the security, stability and well-being of our allies and other nations friendly to our interests. We oppose the expansion of influence, control, or territory by nations hostile to freedom and to other fundamental values shared by America and its allies.[4]

The national interests are intended to be supported by a series of national security objectives. Objectives that are germane to the national interests presented above include:

> a. To deter hostile attack of the United States, its citizens, military forces, or allies and to defeat attack if deterrence fails.
>
> b. To prevent the domination of the Eurasian landmass by the Soviet Union, or any other hostile power or coalition of powers.
>
> c. To maintain stable regional military balance vis-à-vis the Soviet Union and states aligned with it.[5]

The essential means for securing US interests and objectives is deterrence. The President's Commission on Strategic Forces accordingly reported that, "American strategic forces exist to deter attack on the United States or its allies—

and the coercion that would be possible if the public or decision makers believed that the Soviets might be able to launch a successful attack."[6] The report goes on to state that "if they should ever choose to attack, they should have no doubt that we can and would respond until we have so damaged the power of the Soviet state that they will be unmistakably worse off."[7]

Deterrence is achieved by maintaining a credible strategic force structure with the ability to inflict unacceptable damage, and by demonstrating unquestionable resolve to utilize the strategic forces against the very heart of the Soviet Union (or other aggressor) when deemed necessary by the national command authorities (NCA). The question of what constitutes a credible force structure is at the heart of this paper.

Since there has been no exchange of nuclear weapons with the Soviet Union (or any other country), and there has been no direct military conflict with the Soviet Union, it can be argued that US strategic nuclear forces have performed their deterrent function admirably. In a post-START environment the US will have to maintain this credibility by selectively choosing which forces to eliminate and which to retain and modernize or develop. In defining its post-START force structure, the US must keep in mind the elements of the national interest and the national security objectives mentioned earlier, for it is the deterrence which results from these forces which allows this country to achieve these objectives and safeguard its vital interests.

Current US and Soviet Forces

The United States and Soviet Union maintain strong nuclear forces in order to protect their interests and the interests of their allies. These strategic nuclear forces are made up of ICBMs, SLBMs, and bombers (i.e., the three legs of their respective Triads). The current order of battle for US and Soviet strategic nuclear forces are presented in tables 1 and 2.[8] Only bombers dedicated to strategic nuclear roles are included in the tables. The 69 B-52s which have been converted and assigned to conventional roles have been omitted. Bomber forces are given their maximum nuclear payload, and START counting rules are assumed as follows:

a. Penetrating bombers (those that do not use long-range standoff weapons) are counted as one nuclear weapon regardless of actual payload.

b. Standoff bombers (cruise missile carriers) are credited (under Soviet counting rules) with whatever the maximum payload each aircraft can carry. US proposals are to count each cruise-missile-carrying aircraft as 10 weapons regardless of actual payload.

The circular error probable (CEP) listed in tables 1 and 2 is a measure of missile accuracy. A warhead aimed at a target's radius has a 50-percent probability of detonating that target within or above that circle. To reflect uncertainty regarding the precise CEP of each system, CEP estimates have been rounded to the nearest 100 feet.[9]

There are advantages and disadvantages to each leg of the Triad. Some are major areas for concern, while others are very minor. The advantages and disadvantages of each leg should be considered when assembling a force structure, thus creating a balanced force. The major advantages and disadvantages of each leg of the Triad have been summed up by Secretary of Defense Carlucci as follows:

TABLE 1

Current Soviet Strategic Nuclear Forces

Missile	*Range (nm)*	*CEP (ft)*	*Yield (kt)*	*# RVs/ Weapon*	*SSKP* (%)*	*Platform/ Basing*	*# of Platforms*	*Total # of Missiles*	*Total # of RVs*
SS-N-6	1,800	4,900	1,000	1	2.1	Yankee I	16	256	256
SS-N-8	5,500	5,000	800	1	1.7	Delta I/II	22	280	280
SS-N-17	2,500	4,000	500	1	2.0	Yankee II	1	12	12
SS-N-18 (3)	4,000	3,000	100	7	1.0	Delta III	14	224	1,568
SS-N-20	5,100	1,640	100	8	4.1	Typhoon	5	100	800
SS-N-23	5,100	1,640	100	10	4.1	Delta IV	4	64	640
								Total # SSBN RVs	3,556
SS-25	6,500	600	550	1	61.5	Road Mobile	100	100	100
SS-24	6,500	600	100	10	26.4	Rail Mobile	50	50	500
SS-18 (4)	6,800	700	500	10	48.2	Silo	308	308	3,080
SS-19 (3)	6,000	900	550	6	34.7	Silo	350	350	2,100
SS-17 (3)	6,200	1,200	500	4	20.1	Silo	138	138	552
SS-13	5,800	6,000	600	1	1.0	Silo	60	60	60
SS-11	8,000	3,600	1,000	1	3.9	Silo	420	420	420
								Total # ICBM RVs	6,812
								Total Soviet Ballistic Missile RVs	10,368

Bomber	*Range (nm)*	*Weapon*	*Yield (kt)*	*Weapon Range (nm)*	*Payload*	*# of Bombers*	*Total # of Weapons*	*START # of Weapons*
Blackjack	3,000	AS-15	200	1,960				
Bear H	9,000	AS-15	200	1,860	8	70+	560+	560+
Bear G	9,000	AS-4	350	250	2	45+	90+	45+
							Total Bomber Delivered Weapons	650+
							Total START Count Bomber Delivered Weapons	605+
							Total Soviet Strategic Nuclear Weapons	11,018+
							Total Soviet Strategic Nuclear Weapons (START Count)	10,973+

*Single-Shot Kill Probability.

SOURCES: Congressional Budget Office, *Trident II Missiles: Capabilities, Costs, and Alternatives* (Washington, D.C.: Government Printing Office, July 1986), 10–11 and appendix A (originally cited in numerous sources); Lynn R. Sykes and Dan M. Davis, "The Yields of Soviet Strategic Weapons," *Scientific American* 256, no. 1 (January 1987): 29–37; Senate Republican Policy Committee, *Strategic Arms Reduction Talks: After the Moscow Summit*, Washington, D.C., 29 June 1988, 13; *Soviet Military Power: An Assessment of the Threat, 1988* (Washington, D.C.: Government Printing Office, 1988), 48; Joint Staff, *United States Military Posture FY 1989* (Washington, D.C.: Government Printing Office, undated), 39; *The Military Balance 1987–88* (London, England: International Institute for Strategic Studies, 1988), 203 and 207; *Jane's Fighting Ships 1988–89* (London, England: Jane's Publishing Co., 1988), 545–48; *Jane's Weapon Systems 1988–89* (London, England: Jane's Publishing Co., 1988), 7–11, 14–18, 265, 268–69, 368–69, 448, 463–65, 717–18, and 721.

TABLE 2

Current US Strategic Nuclear Forces

Missile	*Range (nm)*	*CEP (ft)*	*Yield (kt)*	*# RVs/ Weapon*	*SSKP (%)*	*Platform*	*# of Platforms*	*Total # of Missiles*	*Total # of RVs*
Trident II	6,000	500	475	8	78.9	Trident			
Trident I	4,500	900	100	8	15.9	Trident/Pos	8/12	384	3,072
Poseidon	2,750	1,500	40	10	3.1	Poseidon	15	240	2,400
								Total # SSBN RVs	**5,472**
MX	6,000	300	300	10	92.3	Silo	50	50	500
Minuteman III	6,000	600	335	3	56.8	Silo	510	510	1,530
Minuteman II	6,000	2,100	1,200	1	16.9	Silo	450	450	450
								Total # ICBM RVs	**2,480**
								Total US Ballistic Missile RVs	**7,952**

Bomber	*Range (nm)*	*Weapon*	*Yield (kt)*	*Weapon Range (nm)*	*Payload*	*# of Bombers*	*Total # of Weapons*	*START # of Weapons*
B-52G	6,500	ALCM	200	1,550	12	98	1,176	1,176
		SRAM*	170	125	20		1,960	98
B-52H	8,700	ALCM	200	1,550	12	96	1,152	1,152
		SRAM	170	125	20		1,920	96
B-1B	6,500	ALCM	200	1,550	22	97	2,134	2,134
		SRAM	170	125	24		2,328	97
							Total Bomber Delivered Weapons	**10,670**
							Total START Count Bomber Delivered Weapons	**4,753**
							Total US Strategic Nuclear Weapons	**18,622**
							Total US Strategic Nuclear Weapons (START Count)	**12,705**

*Short-Range Attack Missile.

SOURCES: Congressional Budget Office, *Trident II Missiles: Capabilities, Costs, and Alternatives* (Washington, D.C.: Government Printing Office, July 1988), 10–11 and appendix A (originally cited in numerous sources); Lynn R. Sykes and Dan M. Davis, "The Yields of Soviet Strategic Weapons," *Scientific American* 256, no. 1 (January 1987): 29–37; Senate Republican Policy Committee, *Strategic Arms Reduction Talks: After the Moscow Summit*, Washington, D.C., 29 June 1988, 13; *Soviet Military Power: An Assessment of the Threat, 1988* (Washington, D.C.: Government Printing Office, 1988), 48; Joint Staff, *United States Military Posture FY 1989* (Washington, D.C.: Government Printing Office, undated), 39; *The Military Balance 1987–88* (London, England: International Institute for Strategic Studies, 1988), 203 and 207; *Jane's Fighting Ships 1988–89* (London, England: Jane's Publishing Co., 1988), 545–48; *Jane's Weapon Systems 1988–89* (London, England: Jane's Publishing Co., 1988), 7–11, 14–18, 265, 268–69, 360–69, 448, 463–65, 717–18, and 721.

> Our deployed submarines are practically invulnerable, but SLBMs currently are less accurate than our ICBMs. Our ICBMs have higher alert rates and provide a more prompt response, but their fixed basing increases their vulnerability. Our bombers are accurate and recallable, but their response is slower than that of ballistic missiles. In their entirety, the synergistic capabilities provided by the three types of weapons systems incorporate all of the elements necessary to deter any type of nuclear attack.[10]

The major advantages that have historically been ascribed to possession of a mix of strategic forces are that (1) the Soviets are precluded from being able to eliminate US nuclear forces by concentrating their efforts on a single strategic solution, and (2) by distributing forces on land, on the sea, and in the air, the Soviet targeting problem is complicated. Considering the historical success of US strategic force mix in deterring aggression, it is likely that all three legs of the Triad may continue to play important roles in a post-START force mix, even though all three legs are likely to be reduced.

START Limitations and Obstacles

Over the past eight years of START negotiations, the goals of reducing the strategic nuclear arsenals of the United States and the Soviet Union have come closer to realization. There are, however, several issues yet to be resolved. These issues involve the US Strategic Defense Initiative (SDI), mobile land-based missiles, air-launched cruise missiles, limitations on sea-launched cruise missiles, and the problems associated with verifying such a complex treaty. US and Soviet differences as of June 1988 are presented in table 3.

TABLE 3

US and Soviet START Positions

	US Position	*Soviet Position*
SNDVs*	1,600	1,600
—Mobile ICBMs	Banned	Permitted
—SLCMs	Not Limited by START No Explicit Limit	Part of START (400 Nuclear SLCMs, 600 Conventional)
Warheads	6,000	6,000
—Ballistic Missile Warheads	4,900	4,900
—Sub-Ceiling	3,300 on ICBMs (Prefers 3,000)	3,300 on SLBMs
—ALCMs	No Explicit Limit	1,100
—Heavy ICBM Warheads	50% Cut (to 1,540)	50% Cut (to 1,540)

*The term *strategic nuclear delivery vehicle* has traditionally referred to launchers of ICBMs, launchers of SLBMs, and heavy bombers capable of delivering their warheads at intercontinental range. The United States would like START to limit deployed missiles rather than the launchers for those missiles.[11]

Among the outstanding issues needing resolution prior to signing any kind of a START agreement, SDI is perhaps the most volatile. The Soviets continue to state that there will be no agreement without banning SDI. The US position is to allow both sides to continue research, development, and testing as required, which is permitted by the Antiballistic Missile (ABM) Treaty, and not to withdraw from this treaty, for a specified period.[12] The United States feels that after the designated period, each side will be free to choose whether or not to maintain the ABM Treaty. The Soviet stance is that both sides should continue to comply unless both come to some other agreed upon outcome. Neither side has yet to concur upon what type of testing would be permitted by the ABM Treaty.

Indications are that the issue of mobile missiles may be resolved. The formal US position is to ban all mobile missiles due to verification problems. The Soviets favor the mobiles with limits on launchers and warheads. Apparently, the feeling after the Moscow summit is that the "U.S. appears to be moving off its proposal to ban mobile missiles."[13]

The ALCM issue centers on range and bomber payload. The SLCM debate is stuck in the area of verification and the difficulty of telling conventional from nuclear weapons. The overall area of verification poses a very tough obstacle. Both sides seem to want to come to some type of START agreement that includes a solution to verification problems.

General Issues Associated with START

Beginning in the 1950s and early 1960s the United States and the Soviet Union began to build their massive nuclear arsenals. As seen in tables 1 and 2 both countries now have in excess of 10,000 strategic nuclear weapons in their respective inventories. The fact that both superpowers have agreed to embark on the START process is evidence that neither side believes that further expansion will add to its security, that indeed, smaller arsenals can enhance the security of each. START presents a vehicle for both countries to maintain credible, modern, and effective nuclear forces at substantially reduced levels. This reduction of strategic nuclear forces should contribute to a more stable international environment, thereby, making the world a safer and better place to live.

The Strategic Arms Limitation Treaty (SALT) limited delivery vehicles and launchers. This encouraged both sides to exploit the relatively novel technology of MIRVs and maximize the number of warheads per delivery vehicle. With START, this rationale will change. Limiting actual warhead numbers in most systems should bring about a tendency to move away from MIRV systems and to systems that have fewer, if not single, warheads. By placing reduced numbers of warheads on the missiles each side can maximize delivery vehicles, thereby maximizing the number of targets the opposition must cover. This should result in strengthening deterrence by making it much harder, if not impossible, for either side to conduct a successful preemptive strike.

Historically the Soviets have been very evasive and difficult to deal with in arms control talks. US negotiators need much determination and patience.[14] Since a START agreement appears to be in the best interest of both countries it is likely that both sides will continue to return to the bargaining table, no matter how difficult the negotiations become.

Notes

1. Henry A. Kissinger, "The Dangers Ahead," *Newsweek* 110, no. 25 (21 December 1987): 34–41.

2. The US Triad has up to 192 RVs for Trident SSBNs loaded with 24 C4, Trident I missiles (each carrying eight warheads). It is presumed that the D5, Trident II missile will also carry eight warheads.

3. Tamar Jacoby and John Barry, "A Nuclear Balance?" *Newsweek* 110, no. 25 (21 December 1987): 28.

4. Frank C. Carlucci, *Fiscal Year 1989 Annual Report to Congress* (Washington, D.C.: Government Printing Office, 1988), 18.

5. Ronald Reagan, *National Security Strategy of the United States* (Washington, D.C.: Government Printing Office, 1988), 4.

6. *Report of the President's Commission on Strategic Forces* (Washington, D.C.: Government Printing Office, 1983), 2.

7. Ibid.

8. In order to standardize the data presented in tables 1 and 2, the single-shot kill probabilities (SSKP) have been calculated against a 5,000 pounds per square inch (psi) target. The method for calculating the SSKPs is as follows:

$SSKP = [1-(0.5^{A}]$, where $A = [6(Y^{.667})]/[H^{.667}(CEP)^{2}]$ "Y" is the yield in megatons."H" is the hardness of the target in psi, and CEP is expressed in nautical miles (nm). Source of the formula is Congressional Budget Office, *Trident II Missiles: Capabilities, Costs, and Alternatives* (Washington, D.C.: Government Printing Office, July 1986), appendix A, originally cited in Lynn Davis and Warner Schilling, "All You Ever Wanted to Know about MIRV and ICBM Calculations but Were Not Cleared to Ask," *Journal of Conflict Resolution* 17, no. 2 (June 1973). The overall system reliabilities have not been included because of a lack of accurate figures in open literature.

9. Congressional Budget Office, *Trident II Missiles*, chap. 1, table 2, note a.

10. *FY 1989 Annual Report to Congress*, 54.

11. Congressional Research Service (CRS), *START: A Current Assessment of the U.S. and Soviet Positions*, Washington, D.C., 3 June 1988, CRS-2.

12. Senate Republican Policy Committee, *Strategic Arms Reduction Talks: After the Moscow Summit*, Washington, D.C., 29 June 1988, 5–6.

13. Ibid., 6.

14. Ken Adelman, "Arms Control: Games Soviets Play," *Reader's Digest* 134, no. 803 (March 1989): 65–69.

CHAPTER 2

START and Targeting

CURRENT US AND Soviet targeting policies for strategic nuclear weapons have evolved along with weapon systems technology. With the signing of START it is likely that both US and Soviet targeting policies will require extensive revision. This chapter reviews current US targeting doctrine and investigates future targeting options which may be effective in a post-START era.

Current US Targeting Policy

> Current US targeting policy has a direct historical lineage to the beginning of the Nixon Administration, when the first substantive moves were made to review the 1962 SIOP [single integrated operational plan]. The past decade has been one of continuous official effort to increase the range of strategic nuclear targeting options available to the President, including an extensive array of counterforce options, and to enhance the possibility that these options could be exercised in such a way that escalation could be controlled.[1]

As stated above, current US targeting policy is mainly one of counterforce. This counterforce emphasis has evolved from the countervalue-centered assured destruction doctrine of the 1960s.[2] As this shift took place the targeting data base began to grow immensely. Between 1974 and 1980 the number of targets grew from about 25,000 to more than 40,000.[3] This large group of targets contains four distinct smaller groups with subgroups within each. The four targeting groups are as follows:[4]

1. Strategic nuclear forces—Examples include ICBMs and intermediate-range ballistic missiles (IRBM), together with their launch facilities and launch command centers, nuclear weapons storage sites, airfields supporting nuclear-capable aircraft, and nuclear ballistic submarine (SSBN) bases.
2. Other military targets (OMT)—OMTs include primarily conventional military forces such as barracks, supply depots, marshaling points, conventional airfields, ammunition storage facilities, and tank and vehicle storage yards.
3. Leadership and control—This target set includes national command and control and leadership centers.
4. Economic and industrial targets—This set of targets is divided into two groups: those dealing with war-supporting industry and those which deal with industry that would contribute to economic recovery. Examples of war-supporting targets include: ammunition factories, tank and armored personnel carrier factories, petroleum refineries, and railway yards and repair facilities. Examples of economic recovery targets include: coal, basic steel, basic aluminum, cement, and electric power.

The targeting scheme for employment of nuclear weapons is divided among several options, each designed for a specific purpose. These options include major attack options (MAO), selective attack options (SAO), limited nuclear options (LNO), and regional attack options (RAO). Options can be utilized independently or in combination, depending on the situation. Each option also allows

for "withholds" for the purpose of sparing specific target categories. Targeting is a complex task with numerous options intended to maximize flexibility.[5]

Flexible Response

Rather than simply choosing either a pure counterforce or pure countervalue targeting policy, a mix of both policies may provide the flexibility desired by the NCA. The resulting policy would provide for targeting all types of targets, military and civilian, and allow for the prosecution of assured destruction as well as damage limitation strategies. Such a policy would continue to emphasize all-out deterrence while also offering a maximum amount of targeting flexibility should deterrence fail.

This type of flexible response posture has its roots in Robert S. McNamara's tenure as secretary of defense. In a statement he delivered in 1965 before the House Armed Services Committee, McNamara explained that the objective of US strategic nuclear forces is to deter aggression.[6] To deter aggression these forces must be able to inflict unacceptable damage on an attacker should deterrence fail. To create a force which could deter aggression on one hand, and be capable of inflicting unacceptable damage on the other hand, he proposed that US nuclear forces maintain two capabilities. The first of these capabilities, he explained,

> We call Assured Destruction, i.e., the capability to destroy the aggressor as a viable society, even after a well planned and executed surprise attack on our force. The second capability we call Damage Limitation, i.e., the capability to reduce the weight of an enemy attack by both offensive and defensive measures and to provide a degree of protection for the population against the effects of nuclear detonations.[7]

Though almost 25 years old, this type of targeting policy may still be the most appropriate for today's forces and the forces that will remain upon the conclusion of START. The assured destruction forces would include some of the ICBMs and SLBMs as well as the manned bombers. The offensive aspect of the damage limitation forces would include the remainder of the ICBMs, SLBMs, and the manned bombers. The defensive aspect of the damage limitation forces would include antibomber forces, anti-SSBN forces (i.e., nuclear-powered submarines—SSN), and any type of antiballistic missile systems (including SDI systems). These forces would target a mixture of counterforce and countervalue targets according to whatever role each would play in the flexible-response strategy.

Force Reductions and Target Reductions

Ideally one side would have a number of targets equal to the number of weapons the other side has. This would allow for complete coverage of all targets and would, in the opinion of many students of deterrence, maximize deterrence by eliminating the advantages of launching first in an attempt to disarm the other side. The reality is that the actual targeting data base will be much larger than the arsenals of either side. With the proposed force reductions of START, both sides would be limited to 6,000 strategic nuclear weapons. This amounts to approximately a 50-percent reduction in strategic forces for both sides (see tables 1 and 2). Although the forces would be cut by about 50 percent, the target base would not shrink proportionally. This is where the post-START targeting problem can occur: how can the United States' strategic nuclear forces maintain the flexibility to cover all necessary targets while being cut by 50 percent? The Soviet Union will face the same dilemma.

Despite the force reductions and the obvious elimination of strategic nuclear

force (SNF) targets, the remainder of the targeting data base is essentially unchanged.[8] Thanks to MIRV technology the elimination of one reentry vehicle does not necessarily mean the elimination of one target. This means that although the strategic forces may be cut by as much as 50 percent, the number of delivery vehicles (i.e., counterforce targets) will most likely not be proportionally reduced.

A recent study conducted by Martin Marietta for the Department of Defense, analyzed the post-START target numbers.[9] The actual report has not been released to the public but certain aspects have been released and were cited in the 22 April 1989 issue of *Jane's Defence Weekly*:

> The report details more than 10,300 strategic Soviet targets including:
>
> **Priority 1 targets** (military assets): 1,500 ICBM silos and launch control centers, 130 strategic submarine bases and support facilities, 80 operating and staging bomber airfields, 140 medium-range missile bases, 94 nuclear weapons storage sites, 50 command posts, 2,240 key communications facilities, 20 ballistic missile defense sites, 67 interceptor aircraft bases, 900 fixed strategic surface-to-air missile sites, 1,200 early warning radars, and 670 additional major complexes and airfields.
>
> **Priority 2 targets** (Soviet leadership network): 1,500 to 1,600 targets consisting of: leadership bunkers, command and control centers, national and regional command posts.
>
> **Priority 3 targets** (Soviet war supporting industry): 1,500 to 1,600 targets consisting of: nuclear weapons production facilities, power plants, hydro-electric facilities, manufacturing facilities for critical components and military hardware production facilities.[10]

The report also detailed the numbers of targets that the United States must be able to hold at risk and destroy within one hour of a surprise attack. These include:

> eight deeply buried national leadership command centers; 25 super-hardened ICBM strategic reserve sites; four ABM [antiballistic missile] launch facilities; 37 regional leadership bunkers; five submarine bases; 13 mobile ICBM sites; 14 bomber sites; 24 air defense interceptor sites and 17 strategic seaports.[11]

Thus it becomes clear that the target base will remain large and diverse and will require some sort of prioritization by US target planners in assigning targets to the reduced number of assets in a post-START force.

Another aspect of reducing strategic nuclear forces is that by cutting forces as much as 50 percent, the relative value of each weapon will increase. This could mean that with a reduced force, each side may be less willing to plan on riding out a first strike by the other side because of the potential damage which their more vulnerable assets may incur. The reduced forces could make options such as launch on warning (LOW) and launch under attack (LUA) look attractive.[12] One way to avoid having to resort to LOW/LUA type strategies is to minimize the vulnerability of the forces, thereby making it difficult for the other side to eliminate them.

In a force reduced by approximately 50 percent the tactics of extended deterrence may become difficult to effect. Although current strategic forces seem to be able to accommodate it, once forces are reduced (and target bases remain almost the same) the extended deterrence policy will have to be reevaluated and targets prioritized.

Post-START Targeting Options

As discussed previously, current US targeting policy includes a great amount of flexibility. With a post-START force, reduced by about 50 percent, it is likely that although the basic objectives of a flexible targeting strategy can be retained, existing targeting priorities will probably need to be reevaluated. A base

of over 40,000 targets being covered by about 6,000 weapons (as opposed to 12,000) may cause the targeting strategy to lose some of its flexibility unless careful planning and prioritization take place. In a damage-limiting role, SNF targets would still be high on the priority list because eliminating them would greatly reduce the potential damage they could do to the United States. OMTs would require careful prioritization since there are many more OMTs than weapons available. Overall objectives of the nuclear forces and the nation's intentions will play important parts in setting the priorities of this category of targets. The remaining target sets (i.e., leadership and control centers and economic and industrial sites) will require the same scrutiny as the OMTs.

As mentioned earlier, one possible post-START strategy could be to adopt a LOW/LUA policy. These policies can contribute to deterrence through a stated threat to any potential aggressor that the first indication of an attack on the United States will automatically trigger retaliation. The major drawback of a LOW/LUA posture is that it reduces the flexibility of the NCA and lowers crisis stability. Because of these reasons LOW/LUA policies should not be the sole strategy of the post-START forces but could play a part in the overall scheme.

What type of post-START force structure the United States decides to retain can dictate targeting policy. If the US opts to build up a force comprised totally of ICBMs, a counterforce policy based on the accuracy of the ICBMs may seem logical.[13] Unless the silos are superhardened and made essentially invulnerable to direct hits from nuclear weapons, this type of force would be compatible with a LOW/LUA strategy. On the other hand, a force made up of only SLBMs and mobile ICBMs could be used in a counterforce or countervalue role, while LOW/LUA would not seem necessary as both types of systems would have relatively good survivability. Thus, the capabilities of each part of the Triad must be considered prior to cutting forces. Each part makes its own contributions to the Triad as well as having its own limitations, and the resultant force will affect the type of targeting policy the nation adopts.

Conclusions

The post-START targeting problems will be difficult to solve. US planners will be trying to maintain the flexibility required by the NCA while at the same time targeting a slightly reduced target base with a drastically reduced nuclear force. Target priorities and mission objectives will have to be clear to the planners in order for them to achieve national objectives in the event deterrence fails. The structure of the post-START force must provide a clear message to any potential aggressors that this force provides the flexibility and capabilities to strike anywhere under the worst possible circumstances. It is the planner's job to take the capabilities of the post-START force and employ them in such a manner as to maximize the effectiveness of the force in obtaining the objectives of the nation.

Based on this discussion, the post-START force targeting strategy should be similar to that in place today. The targeting policy will depend on what type of post-START force mix is achieved. It should be capable of providing the NCA with flexibility in its options and should not be limited to only one type of strategy (i.e., counterforce or countervalue). The post-START targeting strategy may have a portion of the forces which could not survive a direct nuclear attack (such as the silo-based ICBMs) dedicated to a

LOW/LUA policy. However, in order to maintain crisis stability and to preclude an accidental nuclear war, this portion of the force should be kept to a minimum and the LOW/LUA policy invoked only during periods of increased tension. The remainder of the force should be capable of targeting any type of target set. The priorities of targets should be reevaluated since the number of available weapons will be greatly reduced. In summary, the targeting doctrine of the post-START era will be essentially the same as it is now with some possible shifting of target priorities and a potential increase in the importance of defensive measures (i.e., SDI, anti-SSBN operations and air defense).

Notes

1. Desmond Ball, *Targeting for Strategic Deterrence*, Adelphi Paper no. 185 (London, England: International Institute for Strategic Studies, 1983), 17.

2. Countervalue targeting is assumed to be population targeting, while counterforce targeting is designed to hold military forces (nuclear and conventional) as well as military industry and command and control centers at risk.

3. Ball, 23.

4. Robert A. Blaise, "Historical Compendium of U.S. Nuclear Strategic Forces Policy and Doctrine," AIM 81-T-6 (paper prepared for Department of the Navy, Office of Naval Research, Arlington, Va., September 1981), 42–43; and Ball, 23–24.

5. Ball, 24.

6. House, *Statement of Secretary of Defense Robert S. McNamara before the House Armed Services Committee on the Fiscal Year 1966–70 Defense Program and 1966 Defense Budget*, Washington, D.C., 18 February 1965, 37.

7. Ibid., 38.

8. From table 1 and the analysis to be presented in chapter 4, Soviet strategic nuclear delivery vehicles (SNDV), which can be seen as strategic nuclear forces (SNF), are as follows: present forces—1,603 (not including any Blackjack bombers and counting each SSBN as one SNF); post-START forces—1,278 (including a projection of the number of Blackjack bombers). This is a reduction in the number of delivery vehicles of only 325 while at the same time there is almost a 50-percent reduction in the Soviet nuclear arsenal (warheads).

9. Barbara Starr, "Pentagon Studies 'Most Survivable' US ICBM Force Mix," *Jane's Defence Weekly* 1, no. 16 (22 April 1989): 678–79.

10. Ibid. Information similar to this can also be found in Michael M. May, George F. Bing, and John D. Steinbruner, *Strategic Arms Reductions* (Washington, D.C.: Brookings Institution, 1988), 32.

11. Starr, 679.

12. Launch on warning is a strategy whereby weapons of one side would be launched if it is felt that the other side has either launched or is about to launch an attack against you (tactical warning) or seems to be preparing to launch an attack (strategic warning). Launch under attack is a strategy whereby weapons of one side are launched against another side when it is felt that they are under attack either by actual nuclear detonations on their homeland or by technical indications of impending detonations.

13. This would not, however, rule out the obvious countervalue capability, which does not require great accuracy.

CHAPTER 3

START and US Forces

THE BASIC MISSION of the US strategic nuclear forces is summed up by the following statement, presented by the Joint Chiefs of Staff in *United States Military Posture FY 1989*:

> The fundamental objective of U.S. nuclear forces is to remove all incentives for direct attack against the United States and its allies by maintaining the capability to deny the Soviets their objectives under all circumstances and unacceptably damage the most valuable Soviet assets. . . . Equitable and verifiable arms reduction agreements are being pursued in parallel with modernization programs. The goal of the United States is a more stable nuclear balance at lower levels of armament.[1]

Although not usually thought to be one of the elements of the mission of the US nuclear forces, it is clear from the quote that arms reductions are part of the mission.

Strategic Arms Reduction Talks will affect the overall numbers of both the Soviet and US strategic forces. The post-START forces of the United States must still be able to meet the objectives quoted above. This chapter considers the implications of START on the strategic nuclear forces of the United States and lays the groundwork for later examination on how the nation will be able to meet declared force objectives and intentions with forces reduced by about half.

Objectives and Capabilities of US Strategic Forces

The basic objective of the strategic forces of the United States is deterrence. As mentioned previously, the method of deterrence for the US is a combination of a force which can ride out a nuclear strike and still inflict unacceptable damage on the Soviet Union (assured destruction), and one which can limit damage to the United States by destroying Soviet strategic nuclear forces (damage limitation). The Soviet Union realizes, or must be made to realize, that should it launch a nuclear attack on the United States, the United States' nuclear forces will retain the capability to unleash mass destruction on the Soviet homeland. The Soviets must also believe that the United States is willing to use its nuclear forces if necessary. Thus, the United States maintains a strong, credible, survivable strategic nuclear force, which has the mechanisms built into the release systems to allow the NCA to retaliate even under the worst possible condition—after the completion of a Soviet first strike. This force consists of land-based bombers, silo-based ICBMs, and SLBMs. This mix is designed to complicate the Soviet targeting problem and acts as a hedge against the possibility of a Soviet breakthrough against one of the legs of the Triad.

START will cause a reduction in the US nuclear forces by approximately 50 percent. Of course, it will also reduce Soviet nuclear forces by about the same amount. The remaining forces must meet the criteria mentioned above in order to present a force that can threaten and therefore deter Soviet aggression. A

reduction in US nuclear forces will have numerous implications for each leg of the Triad.

US Strategic Bombers

Although the detailed mission descriptions for each leg of the Triad are found only in classified publications, the basic mission can nevertheless be determined with a reasonable degree of precision through analysis of the capabilities of each. The commander in chief, Strategic Air Command, Gen John T. Chain, stated that "the most versatile and flexible part of the Triad is the long-range, manned bombers, which can be recalled, redirected and reconstituted."[2] Chain also said:

> The man on-board the bomber is crucial for detecting, identifying and attacking the growing number of Soviet relocatable targets—those war-fighting assets that can be dispersed and relocated. The capability of the manned bomber to penetrate enemy airspace and seek and destroy these targets—particularly the highly threatening mobile ICBMs—is essential.[3]

The manned bomber offers many features which the other two legs of the Triad do not. The essential element is the flexibility intrinsic to the tactical use of a human being which cannot be found in either ICBMs or SLBMs. Specifically, the crew can be used to locate targets (i.e., strategic relocatable targets—SRTs), determine the condition of the target both prior to and after an attack, evaluate strategic defenses, and conduct reconnaissance. The manned bomber also provides the only recallable strategic nuclear weapon system.[4]

The size of the US strategic bomber force is listed in table 2. The force is made up of aging B-52s and new, but far from trouble-free, B-1Bs. B-52s are located on 11 main bases within the continental United States and at Andersen AFB, Guam.[5] The new B-1Bs are being placed at four bases located in the center of the United States.[6] The B-1B bases are situated to reduce the depressed trajectory SLBM threat from Soviet SSBNs which could be loitering near the US coast.[7]

The drawbacks of the manned bombers are:

- They are slow compared to ballistic missiles.
- They are extremely vulnerable to missiles while on the ground.
- They are vulnerable to air defense systems and tactical fighter aircraft while in the air.
- They are very expensive.

Vulnerability of bombers to nuclear attack has been the subject of many reports. In 1983 the Congressional Budget Office produced one such report which detailed the bomber survivability question.[8] According to this report about 30 percent of the bomber force stands alert on a day-to-day basis. Day-to-day alert means that crews are ready for takeoff in a relatively short period of time.[9] Given strategic warning (i.e., enough time to generate to a crisis alert condition), it is anticipated that about 95 percent of the bomber force would be ready to launch. The study predicts that in a day-to-day posture only about 80 percent of the alert bombers would survive a nuclear attack.[10] The remaining bombers not on alert are assumed to be lost. This means that about 25 percent of the bomber force will survive and 75 percent will be destroyed in an attack without strategic warning. The study also shows that—although the B-1B has the capability to escape its base faster than the B-52 and has its electronics hardened against the electromagnetic pulse of a nuclear blast (and is therefore somewhat less vulnerable than the slower, softer B-52)—the differences in the survivability data between the two forces are less than 10 percent in the most stressful scenarios, and in most others are less than 5 percent.[11] Thus, the B-1B will still have almost the same

vulnerabilities to attack from nuclear ballistic missiles as the B-52.

START would greatly reduce the number of bombers from the present-day number. As a result of this reduction several bases would likely be closed and hundreds, if not thousands, of Air Force personnel would no longer be needed to support and fly the eliminated bombers. The exact impact of the cuts is only speculative, but in most studies which attempt to project post-START force structures, it appears that the ICBMs and SLBMs get looked at very closely, while the bombers tend to be added as "alsos." This appears to be a reflection of the popular bomber vulnerability issue discussed above.

The alternative to retiring a large number of strategic bombers would be to convert them to a conventional role. Although this can be done, and it appears to be one of the logical choices, the problem of verification may make this a difficult task. How, after all, does one tell the difference between a nuclear-capable B-52 and a nonnuclear-capable B-52? The conventional weapons carried by a B-52 would use much of the same equipment and would appear very similar to the nuclear weapons. Over a long period of time, weighing the advantages and disadvantages of simply converting some B-52s to a conventional role and developing methods enabling verification of the payload, the Air Force may conclude that it would be simpler and less costly just to dismantle the B-52s that are removed from nuclear duty.

ICBMs

The current US ICBM force is listed in table 2. The force numbers 1,010 missiles with 2,480 warheads. Many of the latter are potentially capable of killing hard targets. The ICBM offers many advantages over the manned strategic bomber, including faster delivery of a weapon to a target, more accurate fire control solutions due to its fixed location, reduced vulnerability to conventional air defenses, shorter warning time of its approach to the enemy, and better command and control as it does not rely on radio communications. These facts mean that the ICBM outperforms the bomber as a reliable means for getting a weapon to the target.

ICBMs do, however, have something in common with the manned bombers—they are vulnerable to attack prior to launching. The silo vulnerability issue is the biggest drawback to ICBMs and one of the better arguments used against silo basing by the proponents of mobile systems and SLBMs. Another argument is centered around the large number of warheads on the Peacekeeper force (10 reentry vehicles per missile). Theoretically this would allow the Soviets to expend two warheads to achieve a high probability of kill against a Peacekeeper silo containing one missile and 10 warheads. This provides a 5:1 exchange ratio in favor of the Soviets.

In an attempt to reduce silo vulnerability, the Air Force has undertaken a silo upgrade program to harden the silos.[12] These newer, harder silos are the ones used to house the Peacekeeper force and some of the Minuteman III force. Other improvements include better command and control procedures and equipment and more accurate guidance systems.[13]

The US ICBMs are currently based in silos at six locations.[14] All locations are within the north central region of the United States. F. E. Warren AFB, Wyoming, is the home for the Peacekeeper force as well as some Minuteman missiles. The remaining locations contain only Minuteman missiles. Post-START force projections contained in the Congressional Research Service's *START: A Current Assessment of the U.S. and Soviet*

Positions show that the ICBM force may be reduced to as few as 600 silo-based missiles.[15] Although this figure assumes that the US will not deploy a road-mobile ICBM system and will not develop the rail-garrisoned Peacekeeper (RGPK) system, it does provide an upper limit projection of silo-based ICBMs. Reduction of the force to about 600 silo-based ICBMs means that the US would no longer need many of the existing facilities.

Another possibility of post-START ICBM force projections is a force comprised of a mix of road-mobile systems, silo-based ICBMs, and RGPKs.[16] In this Congressional Research Service projection only 200 missiles would be silo based, and the remaining force would be distributed among 50 RGPKs and 486 road-mobile weapons. With this distribution the US would use only one-fifth of the current ICBM silos, but the road-mobile systems will need bases from which to operate. One possible basing solution for the mobile ICBMs would be to place them on existing bases.[17] Although this may be the most economical solution, it would collocate road-mobile and silo-based systems to the advantage of the Soviet targeteer. Another alternative would be to place the mobile systems on government land other than active ICBM bases. This option could utilize the old ICBM bases, but placing the mobile systems on these bases would make Soviet targeting easier because the Soviets would not have to remap the targets. A more effective basing alternative for the mobile systems would be to place them on government land which currently has nothing to do with the ICBMs or other items which the Soviets might already have targeted. Ideally this land would be somewhere in the north central United States to preclude a very short time-of-flight SLBM attack. If based this way, the old ICBM bases could be closed with the resultant personnel cuts and negative impact on local economies.

Whichever post-START force structure the strategic thinkers and planners of the United States select, it appears that the ICBM force will feel a major impact as its current forces are either cut back or have their major mission shifted to mobile systems.

SLBMs

SLBMs offer many of the advantages of ICBMs. They are fast, reliable, and relatively accurate, although not as accurate as ICBMs. The difference in accuracy stems mostly from the inaccuracies contained within the SSBN navigation systems which tell the missiles their location at the time of launch. Without being 100 percent sure of the launch point location, it is difficult to get more accuracy than resides in the existing SLBM inventory. The Trident II achieves accuracies never before seen in an SLBM system.[18] Much of the increase in accuracy is due to the upgraded navigation system which increases the certainty of the launch point location.[19]

Another major difference between SLBMs and ICBMs is their mode of communication. SLBMs, carried on board SSBNs, are dependent on radio broadcasts. Since radio broadcasts are susceptible to interference or jamming, they are not as reliable as the hard-wired system used by ICBMs. Thus, the command and control aspect is the major argument against placing more emphasis on SLBMs than on ICBMs.

The biggest advantage that SLBMs have over both bombers and ICBMs is survivability. SLBMs are not likely to be eliminated by a surprise attack, at least not to the extent that bombers and ICBMs could be. Of course, the small percentage of SSBNs that could be caught in port (about 25–30 percent) would likely be damaged or destroyed, but the large percentage at sea would survive. Only the possibility of a Soviet ASW breakthrough

could pose a threat to the SSBN force. Sea basing and silent patrolling makes the SSBN force the most survivable leg of the US Triad.

With the retirement in the next decade of most Poseidon submarines and the introduction of the Trident II (D5) missile, the SLBM force will become a force comprised of more accurate long-range missiles. In a post-START force, all Poseidon SSBNs would be retired, leaving only the SSBNs carrying the Trident II missile.[20] The technological advances incorporated into the weapon system for the Trident II result in creating the first SLBM system credited with a hard-target kill. This hard-target kill potential combined with the stealth of the SSBN make this leg of the Triad possibly the most effective and most important.

Another advantage the SLBM has over the ICBM and the bombers is that it is a system which can endure long periods of time on patrol without any external support. Bombers require refueling, and silo-based ICBMs are not likely to survive repeated nuclear detonations. SSBNs routinely patrol for approximately 70 days and can extend their patrols if necessary. Food is the limiting factor. If it is known early in a patrol cycle that the SSBN will be required to stay at sea longer than expected, the food can be rationed and the SSBN can stay on patrol much longer than 70 days. Should nuclear war break out during a patrol, it is anticipated that the NCA of the United States will regenerate—if necessary, during the patrol period—and reestablish communication links to the SSBN fleet. The SLBMs thus provide a nuclear reserve force capable of inflicting severe damage to any aggressor. This nuclear reserve force role can realistically be assigned only to SSBNs because of their capacity to endure.

SSBNs are currently based in four locations. Only two of these locations are equipped to handle the Trident SSBN and only these two are expected to be utilized in an all-Trident SSBN force. Therefore, since the post-START force mix will use only these two all Trident SSBN ports, SSBN home ports will be reduced by 50 percent. The Navy has planned this cutback for some time. The only thing that START may do is to regulate the maximum number of Trident SSBNs the United States might use and to retire the Poseidon and Trident I-backfit SSBNs earlier.[21] The Navy's original plan called for 20 Trident SSBNs. Post-START force projections predict the US SSBN force to number between 15 and 18.[22] A cut of only two SSBNs should have little impact, especially when some of these SSBNs have yet to be constructed.

Modernization Plans

Much of the US Triad is undergoing modernization. The bomber force is introducing the B-1B and looking forward to the B-2 stealth bomber. The ICBM force is finally getting a new missile in the Peacekeeper and is anticipating the construction of basing for the RGPK force. The SLBM leg of the Triad is currently finishing the flight testing of the new Trident II missile. The combination of all these improvements makes the entire force much more capable and credible. It also forces the Soviets to consider the possible implications of launching a surprise attack on the United States. In this light, this modern strategic force is strengthening the nation's deterrence.

In addition to the improvements mentioned above, the Air Force is also researching the possibility of a road-mobile ICBM. Although funding for this program has been held to a minimum, there are many proponents of the concept.[23] The obvious advantage of a road-mobile system is that it makes it much harder for the Soviet planners to prepare an effective attack without expending a large

number of missiles in a barrage-type fashion. The mobile system is projected to have a single warhead on each unit, which would make it a costly target because of the poor warhead exchange ratio.[24] The drawback to the mobile system is that it would cost approximately $40 billion to complete and would require about 8,500 Air Force and civilian workers to operate.[25]

Other areas of modernization and research include earth-penetrating warheads (EPW) and the advanced technology bomber (ATB), otherwise known as the stealth bomber or B-2.[26] The EPW is an attempt to hold at risk Soviet deep underground command and control shelters and to counteract further Soviet underground hardening of ICBM silos. The B-2 is aimed at improving the penetration capability of the manned bomber and thereby improving its reliability to deliver a weapon to the target.[27] As with any manned strategic bomber, the B-2 may also be able to track down and destroy relocatable targets.[28]

All modernization programs are designed to reduce or eliminate disadvantages that a particular weapon system may have. Silo vulnerability is fixed by a mobile system; bomber vulnerability is fixed by a bomber that is harder and quicker, and ultimately with a bomber that is almost invisible to radar; and SLBM inaccuracy is fixed with the hard-target-kill-capable Trident II missile.

Economic Impacts of START

Many of the likely major economic impacts of START on the US strategic forces have been suggested already. Many are centered on personnel. It appears obvious that if the United States is to reduce its strategic nuclear forces by 50 percent, some type of personnel cut will come about. In an era of fiscally constrained defense budgets it does not appear likely that these people could be channeled into other DOD jobs.

Along with personnel cuts, there would be facility closures. The old facilities could be redesigned to support other missions, but once again that appears unlikely. Some new facilities would be necessary if the United States decides to go ahead with plans for rail-garrisoned Peacekeepers and the small ICBMs (SICBM). The acquisition of new facilities will be costly and, in an effort to offset these costs, DOD is likely to sell off—or at the very least abandon—as many of the old facilities as possible. Along with facilities being closed, there would be equipment which would no longer be needed. Some of this equipment could be used by the new force, but much of it would become obsolete. The reduction in personnel, facilities, and equipment could lead to economic savings, but it seems unlikely that these savings would offset the higher operating costs of the newer systems.

One item often overlooked is the high-technology world of the weapons industry. Relatively few companies have the personnel and capabilities to produce the strategic nuclear weapons which are being introduced and operated today. As nuclear forces are reduced in attempts to increase worldwide stability, the relatively small group of people who design and build today's weapon systems will likely get smaller. Many of these talented people may be forced to seek work in other fields. It should not be necessary to fund research and development of new weapon systems just for the sake of maintaining this mobilization base for high-tech weapons development and production, but something should be done to retain this pool of highly skilled people should the need arise to utilize them.

Conclusions

Even with the modernization of the US strategic nuclear forces and the introduction of new weapon systems, START will mean force reductions to all legs of the Triad. Although at first glance it may appear that the Navy would suffer the biggest cut from the current force of 36 SSBNs to a projected force of about 17, a closer look shows that the ICBM force is the leg of the Triad most likely to take big cuts. As mentioned above, the Navy has been planning for some time to achieve an SSBN force of only 20 Trident SSBNs. Therefore a cut to about 17 is small by any standard. The current US ICBM force consists of 1,010 ICBMs. Force projections for a post-START force mix show as few as 612 ICBMs.[29] Thus, the ICBM force could feel a 40-percent cut.

No matter which service feels the biggest cut or how bad the force reduction feels to the nuclear forces, it may be necessary to reduce the forces if it is deemed to be in the best interest of the nation, and as long as the national security is maintained. START may be in the best interest of the United States and the Soviet Union, and if so, they must do everything in their powers to achieve such an agreement. The only guiding factors which both sides bring to the negotiations is that both must maintain the security of their respective nations.

START will reduce forces and may save money. Although this is not a large factor in pursuing START, it must be considered as one of the benefits of reaching an agreement.

The reduction in force should cause a reduction in personnel needed to operate and support the forces. It is also likely to cause some base closures. The combined effect of these reductions could have an impact on the economies of the surrounding areas.

Aside from the negative-sounding aspects, the force planners must form the best possible force structure with emphasis on survivability, endurability, accuracy, and connectability. The force must also be cost-effective, be reliable, and be able to maintain the national security objectives which support the national interests.

The aspects provided above do not pertain only to the United States. The Soviet Union will have to look deep into its force structure and strategic doctrine in building a post-START strategic force. It will feel much of the same impact the United States will feel. Because of different strategic doctrine, however, the Soviet Union is likely to feel the impact in different areas than the United States.

Notes

1. *Joint Chiefs of Staff, United States Military Posture FY 1989* (Washington, D.C.: Government Printing Office, 1988), 2.

2. Gen John T. Chain, Jr., "Prepared for the Challenge, Anywhere, Anytime," *Defense 87*, November–December 1987, 59.

3. Ibid.

4. The manned bomber is recallable only when operating in a penetrating role and using short-range weapons and not the long-range, long time-of-flight ALCMs. Although bombers could still be recallable when performing in the standoff role and launching ALCMs, this should not be considered any different from withdrawing release authority from ICBMs and SLBMs prior to their launching.

5. This number of bases includes those which have single integrated operational plan dedicated bombers as well as conventional B-52s assigned.

6. Information on bomber base locations comes from Frank C. Carlucci, *Fiscal Year 1989 Annual Report to Congress* (Washington, D.C.: Government Printing Office, 1988), 237.

7. No official sources were found which would elaborate on this point. However, basing the B-1Bs in Texas, Kansas, and North and South Dakota provides for a much longer flight for any missile

system which might originate from along the coast of the United States (either West or East Coast). It should also be noted that there is no evidence that Soviet SLBMs have a depressed trajectory capability.

8. Congressional Budget Office, *Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives* (Washington, D.C.: Government Printing Office, May 1983), appendix E.

9. A short period of time has been defined as about six minutes and thirty seconds for day-to-day alert, and about two minutes and thirty seconds for bombers placed on crisis alert. The source of these items is Alton H. Quanbeck and Archie L. Wood, *Modernizing the Strategic Bomber Force: Why and How* (Washington, D.C.: Brookings Institution, 1976), 47.

10. *Modernizing U.S. Strategic Offensive Forces*, 105.

11. Ibid., 107. Quanbeck and Wood state that "the B-1 reportedly has been designed specifically to increase its hardness" (p. 50). They credit the B-1 with a strength capable of withstanding a 3-psi overpressure, and the B-52 with only about a 1-psi hardness (p. 50).

12. Evidence on silo upgrade can be found in various *Annual Reports to Congress* from fiscal year (FY) 1973 to the present (Melvin Laird, FY 1973, 68; James R. Schlesinger, FY 1976–1977, II-22 and II-26; Donald H. Rumsfeld, FY 1977, 64; Frank C. Carlucci, FY 1989, 233). The hardening of silos is also discussed in *Jane's Weapon Systems 1988–89* (Alexandria, Va.: Jane's Information Group, Inc., 1988), 22. *Jane's* also discusses the hardening of command and control links as well as emergency power source upgrades.

13. *Jane's Weapon Systems 1988–89*, 22 and 26.

14. *FY 1989 Annual Report to Congress*, 231.

15. Congressional Research Service (CRS), *START: A Current Assessment of the U.S. and Soviet Positions*, Washington, D.C., 3 June 1988, CRS-29.

16. Ibid., CRS-35.

17. Barbara Starr, "Pentagon Studies 'Most Survivable' US ICBM Force Mix," *Jane's Defence Weekly* 1, no. 16 (22 April 1989): 678.

18. The CEP of the Trident II is given by *Jane's Weapon Systems 1988–89* as 120 meters (p. 30).

19. The Trident II strategic weapon system utilizes state-of-the-art electrostatically supported gyroscopic navigators (ESGN) rather than the Ships Inertial Navigation System (SINS) found in the Trident I and Poseidon weapon systems. The ESGN is designed to eliminate much of the "slop" found in the inertial components of the SINS. Discussion of Trident navigation systems can be found in D. Douglas Dalgeish and Larry Schweikart, *TRIDENT* (Carbondale, Ill.: Southern Illinois University Press, 1984). The NAVSTAR program for increasing navigation accuracy is presented on pages 253–255, and Trident II accuracy on pages 273–274. A good source for a general description of the Trident II navigation system is SSPO 0652-025-3, vol. 1, sec. 2-2.

20. This assumes that the existing eight Trident I-equipped SSBNs will be backfitted with the Trident II weapon system.

21. Twelve Poseidon-class SSBNs have been backfitted with Trident I missiles.

22. There are different rationales behind the different force structures which result in the number of SSBNs varying from 15 to 18.

23. *FY 1989 Annual Report to Congress*, 234.

24. The Soviets could see a 5:1 exchange ratio in their favor for a silo-based Peacekeeper. For a single warhead mobile system, they would at best see a 1:1 ratio and would likely see a 1:2 exchange ratio in favor of the US as they would be likely to assign two warheads to each mobile ICBM in order to achieve the desired high probability of kill.

25. *FY 1989 Annual Report to Congress*, 232.

26. "Burrowing Missile to Be Built," *New York Times*, 13 September 1988, I.

27. Penetration capability is improved by reducing the radar cross section of the aircraft. See Bill Sweetman, "Challenge Thrown Down to Soviet Air Defences," *Jane's Defence Weekly* 10, no. 22 (3 December 1988): 1377, for a full description on reducing radar cross sections and the advantages of a low radar cross-section aircraft.

28. Chain, 59.

29. CRS, *START*, CRS-41.

CHAPTER 4

The Soviet Union and START

THIS CHAPTER examines the impact START would have on the strategic nuclear forces of the Soviet Union. Areas discussed include naval forces, land-based forces (i.e., ICBMs), and strategic bombers.

Tables in this chapter present a proposed Soviet post-START strategic force mix. The naval leg of the force mix would suffer the largest cuts in this proposal.

Current Soviet Strategic Naval Forces

The Soviet naval strategic nuclear forces are comprised of three major classes of SSBNs: Typhoon, Delta, and Yankee.[1] Table 1 provides a summary of the Soviet SSBNs and their associated strategic weapon systems.

The oldest Soviet SSBNs are the Yankees which are equipped with the SS-N-6 missile. The Yankees are either being converted to guided-missile submarines with nuclear propulsion (SSGN) or nuclear-powered submarines (SSN), or decommissioned or dismantled.[2] This decommissioning/conversion is required in order to comply with the limitations set forth in SALT.[3]

The Deltas come in four varieties. Missile systems include the SS-N-8, the SS-N-18, and the newest SLBM in the Soviet arsenal, the SS-N-23. The Typhoon is the newest SSBN. It is the largest submarine in the world and carries 20 SS-N-20 missiles.

A review of table 1 reveals that, compared with land-based systems, Soviet SSBNs have weapon systems with relatively poor estimated circular error probables (CEP) which translate into relatively low estimated single-shot kill probabilities (SSKP). Over time there has been a trend of increasing ranges, and multiple, lower-yield warheads with decreasing CEPs.

The Soviet SSBNs are based in only two of the four operating Soviet fleets: the Northern Fleet, with a home port on the Kola Peninsula, and the Pacific Fleet with home ports in Petropavlovsk and Vladivostok. To date, all Typhoons and Delta IVs are in the Northern Fleet. The remainder of the SSBNs is split between the Northern and Pacific Fleets.[4]

Although the Soviets maintain a larger fleet of SSBNs than the United States, they maintain a smaller percentage at sea.[5] While the possibility of technical constraints may partially explain the low levels of alert SSBNs in the past, the practice appears to be related to much broader aspects of a Soviet operational philosophy.[6] These low alert rates are consistent with the Soviet Union's "preference for conserving its military assets by limiting their peacetime operations and holding down the potentially high expense of maintaining a large military force."[7]

By keeping the majority of Soviet SSBNs in port, the Soviets are able to reduce machinery wear, conserve fuel, and maintain a ready fleet. It is possible

that the Soviets may operate this way in order to allow in-port SSBNs to actually cover alert target packages.[9] By operating in this manner the command and control problem would be simplified by having the SSBN tied to the pier and receiving communications from land lines as well as through normal fleet radio channels. Presumably in a state of heightened tension these SSBNs would be flushed out into areas close to the Soviet homeland.[9] The SSBNs would depart their home ports with the latest targeting updates and with the latest operational orders. The SSBNs would also deploy in as near a 100-percent condition of readiness as possible, having had direct access to maintenance facilities and having kept equipment either turned off or used in such a limited way as to extend periodic maintenance requirements. By staying in home waters when they deploy, the potentially complex problem of submarine command and control would still be simplified, and the risk of quick elimination by Western anti-SSBN forces lowered. Although no open source could be found to corroborate this theory, it seems to fall in line with the apparent Soviet strategic doctrine of keeping tight control over strategic forces.[10]

Current Soviet Strategic Land-Based Nuclear Forces

As seen in table 1, the Soviet strategic land-based nuclear forces are made up of several types of silo-based ICBMs as well as two new mobile systems, the SS-24 rail-mobile and SS-25 road-mobile ICBMs. According to the Congressional Budget Office, this arsenal contains no hard-target-kill-capable warheads.[11] It is possible that the SS-24 may be a hard-target-kill system if it is mated with a warhead larger than the 100-kiloton (kt) warhead it is currently estimated to have.

START force proposals project that the Soviets will eliminate all ICBMs except their SS-18/24/25 systems. The latter include the newest systems with the highest SSKPs, and as will be discussed later, the extremely valuable mobile systems. As a corollary, the Soviets are projected to eliminate their aging systems in favor of more modern systems with much greater SSKPs.

Current Soviet Strategic Bomber Forces

The Soviet Union has three classes of strategic bombers: Bear, Bison, and Blackjack.[12] Of these, the Bison bombers are extremely old and in need of replacement. The Bears carry the majority of the weapons (estimated to be approximately 900) and constitute the greatest percentage of the bomber force.[13]

As will be seen below, Congressional Research Service (CRS) force projections for a post-START force predict that the Soviets will eliminate the Bison and Bear A/B/C bombers in favor of the Bear G/H and the Blackjack bombers.[14] This appears to be a logical approach and is one of the least controversial aspects of a post-START force postulation.

Current Soviet START Force Projections

Table 4 presents a candidate Soviet post-START strategic force mix which would comply with the United States' desire to eliminate mobile ICBMs.[15] Table

5, on the other hand, depicts an alternative force mix based on the Soviet preference to include the SS-24 and SS-25 mobile ICBM systems. Both tables assume that the SS-N-20 carries nine warheads and the SS-N-23 only four. In a joint US–Soviet statement made after the Washington summit on 10 December 1987, the ballistic missile counting rules were announced. Among these counting rules each SS-N-20 was to be counted as having 10 warheads and each SS-N-23 as having only four.[16] Therefore, tables 6 and 7 present the same force projections as tables 4 and 5 with the only differences being the variations in reported SS-N-20 and SS-N-23 warhead counts. These slight changes have little effect on the overall force projection.

Impact of START Proposals on Soviet Strategic Nuclear Forces

As can be seen in tables 4 through 7, the SSBN leg of the Soviet strategic force mix will suffer the largest proportionate cuts if a START agreement is reached. It currently numbers in the range of 62 modern SSBNs. Force proposals as put forth by the congressional research staff show a maximum post-START SSBN force numbering only 15; that is, a reduction of 76.2 percent.[17] By anyone's standards this would be a drastic decrease. Total ICBM numbers could fall from the current inventory of 1,426 to approximately 1,039 (27.1-percent cut).[18] The Soviet long-range strategic bomber force could be cut from about 312 bombers to a projected force of 236 (24.3-percent cut).[19]

It is anticipated that the Soviets will retain their most modern and capable SSBNs and retire or convert their older boats. With five Typhoon-class SSBNs already built and two under construction it is likely that the Typhoon will be the prime entity in the Soviet SSBN force.[20] The Delta IVs are also very new. With four already built and one currently under construction it is unlikely the Soviets would scrap this program in favor of the Delta's older versions.[21] As seen in table 1, both the SS-N-20 and the SS-N-23 have estimated SSKPs of 4.1 percent. These SSKPs are more than twice as good as any other current Soviet SLBM system. Thus, these systems would most likely be the cornerstone of a Soviet post-START SSBN force.

As mentioned earlier, the Soviets maintain the majority of their SSBN force in port (approximately 80 percent). Using current percentages of deployed versus in-port SSBNs, a post-START force of 12 SSBNs would have only three SSBNs at sea while the remaining SSBNs would be tied up in port. Since a START-mandated cut in absolute numbers will raise the relative value of the remaining units, it appears unlikely and unwise to retain such a high percentage of the force in port. It therefore seems logical for the Soviet Union to increase the fraction of SSBNs kept at sea to the percentages practiced by the United States.[22]

However, placing a higher percentage of SSBNs at sea is probably not a simple thing to do. In order to do so, the Soviets will presumably have to increase the reliability of their systems to a point where the SSBNs will be almost as effective on the last day of their patrols as on the first day. The US has made an extensive and costly effort to achieve this objective, over a period of 28 years. Hence, the Soviets may not be able to quickly field a reliable SSBN force, capable of extended and repeated patrols. The alternative is to either get rid of the existing force altogether (or at least de-emphasize it considerably), and replace it with systems that are equally survivable and more reliable, or to keep the current SSBN operating patterns and rely on having enough warning time to sortie the SSBNs out of port in a crisis.[23]

TABLE 4

Soviet Force Projection (without Mobiles)

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
SS-18	154	10	1,540
SS-24 (Silo)	104	10	1,040
SS-24 (Rail-Mobile)	N/A	N/A	N/A
SS-25 (Silo)	720	1	720
SS-25 (Road-Mobile)	N/A	N/A	N/A
Subtotal:	978		3,300
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
SS-N-20 (Typhoon)	100	9	900
SS-N-23 (Delta IV)	128	4	512
SS-N-8 (Delta II)	16	1	16
SS-N-8 (Delta I)	12	1	12
Subtotal:	256		1,440
Total: ICBM/SLBM Warheads			4,740
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
Bear G (Penetrate)	100	2	200
Bear H (Standoff)	100	10	1,000
Blackjack (Penetrate)	160	4	640
Subtotal:	360		1,840
START Count	360		1,260
True Total: SNDVs/Warheads	1,594		6,580
Total: START Count	1,594		6,000
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Typhoon (SS-N-20)	5	20	100
Delta IV (SS-N-23)	8	16	128
Delta II (SS-N-8)	1	12	12
Delta I (SS-N-8)	1	12	12
Total:	15		

Source: Congressional Research Service, *START: A Current Assessment of the U.S. and Soviet Positions*, Washington, D.C., 3 June 1988, CRS-51.

TABLE 5

Soviet Force Projection (with Mobiles)

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
SS-18	154	10	1,540
SS-24 (Silo)	25	10	250
SS-24 (Rail-Mobile)	99	10	990
SS-25 (Silo)	450	1	450
SS-25 (Road-Mobile)	450	1	450
Subtotal:	1,178		3,680
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
SS-N-20 (Typhoon)	100	9	900
SS-N-23 (Delta IV)	80	4	320
Subtotal:	180		1,220
Total: ICBM/SLBM Warheads			**4,900**
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
Bear G (Penetrate)	40	2	80
Bear H (Standoff)	96	10	960
Blackjack (Penetrate)	100	4	400
Subtotal:	236		1,400
START Count	236		1,100
True Total: SNDVs/Warheads	**1,594**		**6,340**
Total: START Count	**1,594**		**6,000**
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Typhoon (SS-N-20)	5	20	100
Delta IV (SS-N-23)	5	16	80
Total:	10		

Source: Congressional Research Service, *START*, CRS-67.

TABLE 6

Soviet Force Projection (without Mobiles)

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
SS-18	154	10	1,540
SS-24 (Silo)	102	10	1,020
SS-25 (Rail-Mobile)	N/A	N/A	N/A
SS-25 (Silo)	756	1	756
SS-25 (Road-Mobile)	N/A	N/A	N/A
Subtotal:	1,012		3,316
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
SS-N-20 (Typhoon)	120	10	1,200
SS-N-23 (Delta IV)	96	4	384
Subtotal:	216		1,584
Total: ICBM/SLBM Warheads			4,900
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
Bear G (Penetrate)	40	2	80
Bear H (Standoff)	96	10	960
Blackjack (Penetrate)	100	4	400
Subtotal:	236		1,400
START Count	236		1,100
True Total: SNDVs/Warheads	1,464		6,340
Total: START Count	1,464		6,000
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Typhoon (SS-N-20)	6	20	120
Delta IV (SS-N-23)	6	16	96
Total:	12		

Source: Congressional Research Service, *START*, CRS-51.

TABLE 7

Soviet Force Projection (with Mobiles)

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
SS-18	154	10	1,540
SS-24 (Silo)	N/A	N/A	N/A
SS-24 (Rail-Mobile)	99	10	990
SS-25 (Silo)	320	1	320
SS-25 (Road-Mobile)	466	1	466
Subtotal:	1,039		3,316
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
SS-N-20 (Typhoon)	120	10	1,200
SS-N-23 (Delta IV)	96	4	384
Subtotal:	216		1,584
Total: ICBM/SLBM Warheads			4,900
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
Bear G (Penetrate)	40	2	80
Bear H (Standoff)	96	10	960
Blackjack (Penetrate)	100	4	400
Subtotal:	236		1,440
START Count	236		1,100
True Total: SNDVs/Warheads	1,491		6,340
Total: START Count	1,491		6,000
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Typhoon (SS-N-20)	6	20	120
Delta IV (SS-N-23)	6	16	96
Total:	12		

Source: Congressional Research Service, *START*, CRS-57.

Their low-tempo deployment patterns suggest that the Soviet navy has not duplicated the US two-crew system for SSBNs but instead relies on single crews. If, however, the Soviets are forced to increase the percentage of their SSBNs at sea, they will have good reason to investigate a two-crew concept of operations. Without a two-crew system it would seem unlikely that the Soviets will be able to maintain a credible SSBN force with the amount of at-sea time that would be necessary in a post-START environment.[24]

Other areas the Soviets might have to improve to maintain a higher percentage of SSBNs at sea include the command and control system, personnel training, time intensive refit management, the reliability of the SSBN mechanical systems, alert SSBN operations, and shore support. All of these areas require efficiency and mastery to permit extended SSBN patrols, which may need to be the norm in a weapons-scarce post-START environment.

The bottom line is that the Soviets have a great deal of work ahead of them if they are determined to put a larger percentage of their SSBNs at sea in order to increase the survivability of a much smaller fleet. Whether or not it is too much work, and whether the Soviets are willing (and capable) to tackle the job, is open for debate. Given the resources that have been invested in their modern SSBNs (i.e., Typhoon and Delta IV) it seems unlikely that the Soviets would scrap them without at least attempting to put a larger percentage of SSBNs to sea in an alert posture.

An SSBN force reduction to about 12 submarines will free many conventional assets that are presently thought to be assigned to pro-SSBN defensive duties. This new surplus of general-purpose forces will be available for alternative roles and missions. The reduction would also free a large amount of funding. Old SSBNs absorb much of the maintenance and refurbishment budget, and crews require constant training. By removing up to 50 old SSBNs the Soviets would ease the requirements for training, maintenance, and overall readiness. This would result in a substantial savings, which the Soviet Union needs (as exemplified in any one of a number of public statements made by Soviet General Secretary Mikhail Gorbachev). Many maintenance, training, and home port facilities can be either reduced in scope or eliminated totally for substantial cost savings. Personnel requirements would likewise be cut as would be the associated shore support personnel needs.

Importance of the SS-24 and SS-25 Land-Based Systems

If one were to construct the ultimate strategic weapon it might have the following characteristics:

- Accuracy
- Reliability
- Long range
- Survivability
- Endurance
- Inexpensiveness
- Maintainability

The Soviet Union's SS-24 and SS-25 land-based mobile missiles meet several of these criteria. They offer a degree of survivability heretofore achieved only by SSBNs, and at the same time, they can overcome the difficult command and control problem associated with SSBNs. The systems offer a much higher SSKP than any of the existing Soviet SLBM systems. Thus, if it is true that the Soviets are having difficulties with the reliability of their SSBNs, then it is reasonable to postulate that they may be willing to bargain away their SSBNs in favor of holding on to an inventory of SS-24s, SS-25s, and successor missiles.[25]

The US position in the current START negotiations is for elimination of all land-based mobile systems.[26] With the introduction of the SS-24 and SS-25 and their relatively good SSKP values, coupled with the advantages mentioned above, it appears unlikely that the Soviets are willing to enter into any kind of agreement prohibiting such effective systems. Ironically, it is conceivable that the Soviets got the original idea for the development of the SS-24 rail-mobile system from earlier US concepts. In the early 1960s there were plans for a rail-mobile minuteman scheme. If so, the United States may take credit, in part, for the survivable mobile systems that the Soviets are deploying today.

The Best* Post-START Force for the Soviet Union

This section attempts to formulate the best post-START strategic force for the Soviet Union. This force will be formal based on system characteristics and capabilities. The best Soviet strategic force mix in a post-START environment is presented in table 8.

The Soviet Union has invested a great deal of time and money in its Typhoon and Delta IV programs. These SSBNs carry the most effective SLBMs in the Soviet arsenal. SSBNs offer the Soviets an effective strategic reserve force which can be used in a war termination role. Thus, it is unlikely that the Soviets would give up their SSBNs entirely but would rather make the effort to use them in much the same way as the United States does; that is, keep them at sea. Since there are already five Typhoons and four Delta IVs, it seems reasonable to postulate a force of at least 10 SSBNs, and more likely a force of 12. This force is based on the assumption that the SS-N-23 will be downloaded to carry only four warheads and not its current 10.[27] A force of 12 SSBNs would require much less total pro-SSBN support from conventional forces and still provide a strong war termination bargaining reserve (up to 1,344 warheads).[28]

In the area of ICBMs, the best solution for the Soviets would be to allow land-based mobile systems. The Soviet insistence in retaining mobiles may imply the intention to adopt a no-first-use policy.[29] From a deterrence standpoint, this is desirable to both sides.

Although manned bombers have great flexibility in targeting and are recallable, they are easily targeted when on the ground, are relatively soft targets, cannot deliver weapons as fast as an ICBM or SLBM, and have much less chance than ballistic missiles to reliably deliver their weapons against a designated target. Bombers are also costly. For these reasons it would best suit the Soviets to limit their bomber fleet to that specified in table 8.

The aggregate of such a force provides the Soviets with a capable, effective, modern nuclear strategic force. It combines the best of the three legs of a Soviet Triad. It also allows for economy of assets in that the force reduction will cost little more than has already been spent, and it will eradicate the costs of maintaining some of the older weapon systems. This mix will raise the overall force SSKP, thereby making it a more deadly force, and it will allow the Soviets to de-emphasize the importance of their SSBNs because of the great deterrent value of their mobile systems.[30] Overall, this force will enhance the Soviets' strategic nuclear credibility, while at the same time reduce costs and eliminate thousands of nuclear weapons, resulting in world approval. The Soviets can advance in two areas: political gains (worldwide ap-

*Best in this case refers to a force that has high SSKPs and is survivable, endurable, reliable, modern, flexible, and economical.

proval) and military gains (a credible and deadly nuclear force). While doing so they can greatly reduce costs, thereby also achieving economic benefits.

TABLE 8

Best Soviet Post-START Force

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
SS-18	154	10	1,540
SS-24 (Silo)	40	10	400
SS-24 (Rail-Mobile)	60	10	600
SS-25 (Silo)	100	1	100
SS-25 (Road-Mobile)	716	1	716
Subtotal:	1,070		3,356
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
SS-N-20 (Typhoon)	120	10	1,200
SS-N-23 (Delta IV)	96	4	384
Subtotal:	216		1,584
Total: ICBM/SLBM Warheads			**4,940**
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
Bear H (Standoff)	96	10	960
Blackjack (Penetrate)	100	4	400
Subtotal:	196		1,360
START Count	196		1,060
True Total: SNDVs/Warheads	**1,482**		**6,300**
Total: START Count	**1,482**		**6,000**
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Typhoon (SS-N-20)	6	20	120
Delta IV (SS-N-23)	6	16	96
Total:	**12**		

Conclusions

The START force proposals put forth in this chapter, which provide the Soviets with a very credible force, will have a great impact on Soviet strategic nuclear forces, as well as the entire Soviet military. The major impact will be felt in the SSBN fleet with a reduction from 62 to approximately 12 SSBNs. This reduction will bring with it a cutback in shore support facilities and personnel. The result will be a smaller, more credible SSBN force which will keep a higher percentage of the force at sea.[31] This force will likely be manned by a two-crew system similar to that of the United States. Maintenance and training crews will have to work harder to keep the ships on their deployment schedule. Money will be saved from the reduction of ships and shore facilities but will be spent on improving the reliability of critical system components. Overall, there will be a net savings in money, people, and facilities.

ICBMs will be reduced in numbers of warheads but the overall SSKP will increase dramatically for the ICBMs. The ICBM force will be modern, mobile, deadly, and much more survivable than the current force. Based on the above information it would appear that the Soviets can only stand to gain (politically, militarily, and economically) from Strategic Arms Reduction Talks.

Notes

1. START, like SALT, deals only with modern SSBNs. SALT defines Soviet modern SSBNs as the Yankee, Delta, and Typhoon classes. Hotel SSBNs and Golf SSBs will not enter into the START negotiations and will not be discussed in this article.

2. *Jane's Fighting Ships 1988–89* (London: Jane's Publishing Co., 1988), 548, 553, and 559.

3. SALT limits the Soviet Union to 62 modern SSBNs. Source is *Jane's Fighting Ships 1988–89*, 548 and 559.

4. According to *Jane's* (p. 544), there are 38 SSBNs assigned to the Northern Fleet and 25 SSBNs assigned to the Pacific Fleet. This total of 63 SSBNs includes one Northern Fleet Hotel III SSBN.

5. "Only a small fraction of the strategic missile submarine force is deployed at sea." From Robert P. Berman and John C. Baker, *Soviet Strategic Forces: Requirements and Responses* (Washington, D.C.: Brookings Institution, 1982), 36–37. Three Yankees and three Deltas on patrol in the Northern Fleet areas and two Yankees and two Deltas on patrol in Pacific Fleet areas are numbers that James J. Tritten presented in his book entitled *Soviet Naval Forces and Nuclear Warfare* (Boulder, Colo.: Westview Press, 1986), 28. These numbers would indicate that of the 62 SSBNs allowed by SALT I, 10 would be at sea (in normal peacetime conditions). This equates to 16.1 percent at sea and 83.9 percent in port.

6. *House, Department of Defense Appropriations for 1980: Hearings before a Subcommittee of the Committee on Appropriations*, 96th Cong., 1st sess., 1979, pt. 3:476–77.

7. Congress, *Allocation of Resources in the Soviet Union and China—1978: Hearings before the Subcommittee on Priorities and Economy in Government of the Joint Economic Committee*, 95th Cong., 2d sess., 1978, pt. 4:67–68.

8. Adm J. D. Watkins stated that "the Soviets have ready submarines in port, 50 percent operating at sea and the rest are ready to fire missiles in port." House, *Department of Defense Appropriations for 1986: Hearings before a Subcommittee of the Committee on Appropriations*, 99th Cong., 1st sess., 1985, pt. 2:927.

9. Possibly these submarines would sail to areas where coordinated antisubmarine warfare (ASW) forces could assist in protecting the SSBNs from possible intruders.

10. A review of Soviet command and control found in Stephen M. Meyer, "Soviet Nuclear Operations," *Managing Nuclear Options*, ed. Ashton B. Carter, John Steinbruner, and Charles A. Zracket (Washington, D.C.: Brookings Institution, 1987), reveals the importance the Soviets place on the integrity of their command and control systems. Out of this one can imply that the Soviets would prefer to maintain close control over their forces rather than allow them to operate for long periods of time out of contact and working from an operation order.

11. Congressional Budget Office, *Trident II Missiles: Capabilities, Costs, and Alternatives* (Washington, D.C.: Government Printing Office, July 1986), establishes three classes of hard-target warheads. A warhead that can achieve SSKP > 70 percent against a 5,000-psi target is classified a class 1 warhead. Those that have SSKP > 70 percent against a 2,000-psi target are classified class

2. Class 3 warheads must achieve at least 70 percent SSKP against a 500-psi target.

12. The Backfire bomber has been excluded from the START negotiations as a result of the SALT I and SALT II (unsigned). During negotiations for SALT, the Backfire bomber was determined to be a medium-range bomber and thus not counted along with the heavy intercontinental bombers. *Jane's All the World's Aircraft 1987–88* (London: Jane's Publishing Co., 1987), 283.

13. Congressional Research Service (CRS), *START: A Current Assessment of the U.S. and Soviet Positions* (Washington, D.C.: Government Printing Office, 3 June 1988), CRS-70, credits the Soviets with 100 Bear bombers, 50 Bear H bombers, and 15 Bisons. They have no figures for the Blackjack.

14. The Bisons and A/B/C variants of the Bear reached initial operational capability in 1956. *Jane's All the World's Aircraft 1987–88*, 280–81.

15. Force projections are taken from the CRS, *START*.

16. "Joint US–Soviet Summit Statement," *Survival*, May–June 1988, 268.

17. This number would be accurate if the SS-N-23 is downloaded to carry only four warheads instead of the current estimate of 10.

18. ICBM RV numbers could fall approximately 51 percent from 6,812 to about 3,316.

19. This force includes Bear A/B/C/G/H, Bison, and Blackjack bombers.

20. *Jane's Fighting Ships 1988–89*, 545.

21. Ibid., 546.

22. According to Admiral Watkins, in testimony before the House, *DOD Appropriations for 1986*, the US keeps almost 70 percent of its SSBNs at sea at any one time (p. 926).

23. Some say the SS-24 and SS-25 land-based mobile systems could do this for the Soviets. Part of this argument can be found in the CRS, *START*, CRS-10.

24. Admiral Watkins stated in his testimony before the House, *DOD Appropriations for 1986*, that the Soviets do have a two-crew system for their SSBNs (p. 927). However, this is the only open source found which makes this statement.

25. CRS, *START*, CRS-10.

26. Although the formal US position on land-based mobile systems is that they want them banned, there have been some indications of a softening of this position. This was cited previously in chapter 1.

27. Table 1 shows that the SS-N-23 is currently credited with 10 warheads. As previously mentioned, the Soviets have stated that for the purposes of START counting the SS-N-23 will have only four warheads. This means the SS-N-23s will either be grossly underloaded if they continue to carry the present warhead or they will deploy with a new, heavier warhead which would increase the SSKP of this system.

28. Although the SSBN force may be cut by about 80 percent, it is unlikely that the pro-SSBN forces would take a proportionate cut. A smaller SSBN force would make each unit much more valuable, thereby precluding a straight 80-percent cut in pro-SSBN forces. Overall, the pro-SSBN forces will feel a large cut. However, the pro-SSBN support for each SSBN will most likely increase.

29. For further discussion, see CRS, *START*, CRS-17.

30. Average force SSKP against a 5,000-psi target (calculated by averaging SSKP per warhead for each missile type and averaging these figures over the entire force) prior to a START (excluding bombers) is 25.268. For the post-START force listed in table 8 (less bombers) this value is 33.404. Comparable US figures are 24.766 prior to START, and 81.907 after START (using a mean of the projected START force proposals presented in the CRS, *START*).

31. The force will be more credible because it will be modern and quiet, have a relatively good SSKP, and be harder to locate by Western ASW forces even in a nongenerated posture.

CHAPTER 5

US Post-START Force Structure

THE PREVIOUS chapters have discussed the background issues associated with Strategic Arms Reduction Talks. This chapter presents a post-START strategic force structure which this author believes would be best for the United States. This chapter also briefly touches on the potential impact that issues such as Strategic Defense Initiative (SDI), mobile ICBMs, and submarine-launched cruise missiles (SLCM) could have on a final force mix and the START process in general.

As stated in chapter 1, any post-START strategic nuclear force mix must be structured to ensure the national security objectives of the United States and thus to secure the national interests. The criteria for the best force mix are defined according to the preference of the author. Before a force mix can be built, the criteria of the force must be defined and prioritized. Each aspect of the force is examined below and evaluated for the relative priority it will have on the final best force mix.

Force Criteria

A key aspect of any force is its ability to survive an attack by any aggressor. A force which is not survivable is a force which so limits the flexibility of the NCA that it is of little value in maintaining the national security. A force that is not survivable might only be used in a launch-on-warning or launch-under-attack (LOW/LUA) mode and thus not be conducive to crisis stability.

The definition of survivability for this author is the ability to ride out a massive first strike from an aggressor. This implies that the force is then capable of retaliating and inflicting damage on the aggressor. Currently, the US ICBM and bomber forces are not considered survivable according to this definition.[1] Any portion of the SLBM leg of the Triad caught in port would also not be considered survivable. The only current forces which meet the criteria of being survivable are the deployed SSBNs. Survivability should be a high priority in the design of any strategic nuclear force.

Connectability is the ability of the force to maintain communications with the NCA, especially during a crisis. Ideally, the command and control links would be hardened and virtually invulnerable to any type of attack. Maintaining the communication links with the proper nuclear release authority is essential to accomplish the mission. Without that communication link, the forces are almost useless. In today's forces only the ICBMs come close to being connectable 100 percent of the time. As part of the silo upgrade programs mentioned in chapter 3, the communication links have been hardened and redundancy has been built in to increase reliability.[2] Although the communication systems on the bomber and SSBN legs of the Triad have been made reliable, they cannot approach the reliability inherent in a dedicated communication line (i.e., a "telephone" link).[3]

Endurability is the ability of the force to endure independently for long periods of time, especially after an attack. A force

which can endure is a force which can be used for war-termination efforts; and endurability coupled with survivability forms a force which projects a strong deterrent value. SSBNs at sea are obviously very enduring forces; as discussed in chapter 3, patrol duration is limited only by onboard food supplies. ICBMs have become more enduring with the upgrading of silos, including better emergency power supplies. However, they still fall short of the endurability of the SSBN. Arguably, the bomber force possesses the least amount of endurability in that it relies on refueling in order to remain in the air. Without refueling, strategic bombers are only capable of contributing to the Triad for as long as their initial fuel loads hold out.

The measure of accuracy is fairly simple. A review of CEP data, such as the data presented in tables 1 and 2, is usually all one needs to measure the accuracy of a component of the force. Accuracy has a direct bearing on SSKP, which correlates, in turn, with hard-target-kill capability. Ideally, accuracies are good enough to allow the warhead yield to become so low as to preclude collateral damage while at the same time reliably destroy the target. In the current force, ICBMs have the highest accuracy. Bombers, in a penetrating role, should have the next-best accuracy.[4] The element of the current forces which has the lowest (relative) accuracy is the SLBM. The Trident II missile should overcome this weakness and place the SLBM alongside the ICBM in system accuracy.

Accuracy affects the target set a weapon system can cover. An accurate system can cover all target sets, while an inaccurate system may only be suitable for soft targets or countervalue targeting. Therefore, to build a force with maximum flexibility, the force must have highly accurate weapons. One method of overcoming poor accuracy is to increase the weapon yield. While this method will raise the SSKP for the weapon, it will also raise the weight of the warhead and increase the chances for undesirable collateral damage.

A weapon system that is unreliable is worthless. Reliable systems are costly and can take long periods of time to develop. Reliability used here refers to the system's probability of delivering a weapon to a target and detonating that weapon at the prescribed location. Actual reliability figures for US strategic nuclear weapon systems are found only in classified documents. This data is collected and compiled through numerous flight tests of various systems.

Ideally a weapon system will be cost-effective; that is, it will maximize the utilization of funding spent on development and procurement by providing a very good product. A good product might be a system which has high ratings in all of the above categories. Modern strategic systems are very costly. The current era of fiscal constraint necessitates that all new weapon systems be cost-effective.

Although cost should not dictate which system is best for any nation, cost-effective systems are the only ones which are likely to have a future. When a system is deemed to be not cost-effective, it is usually because there are alternatives which perform the same prescribed mission, with equal reliability, at a lower cost. Unless the system can be made competitive its future is likely to be doubtful, as alternative systems will probably replace it.

The Best Post-START Force Mix for the US

Based on these criteria a force mix is presented in table 9. The systems which are included in table 9 are those which are either operational, in the final stages of testing prior to becoming operational, or currently under development and

funded. Table 9 has excluded the B-2 bomber because of the lack of data available on a potential payload and the possible funding problems it faces.

If a post-START force mix can be created which will meet all of the criteria discussed previously, then the United States could feel secure in pursuing a START agreement which might reduce its strategic nuclear forces by about 50 percent. If, on the other hand, only part of the criteria can be met, the United States would have to consider the advantages and disadvantages of START prior to finalizing it.

TABLE 9

Proposed US Post-START Force Mix

ICBMs	*ICBMs*	*RVs/ICBMs*	*Warheads*
Minuteman III	45	3	135
Peacekeeper (Silo)	50	10	500
Peacekeeper (Rail-Garrison)	50	10	500
SICBM (Mobile)	500	1	500
Subtotal:	645		1,635
SLBMs	*SLBMs*	*RVs/SLBMs*	*Warheads*
Trident II (D5)	408	8	3,264
Subtotal:	408		3,264
Total: ICBM/SLBM Warheads	1,053		4,899
Heavy Bombers	*Bombers*	*Warheads/Bombers*	*Warheads*
B-52 (Penetrate)	104	20	2,080
B-52 (Standoff)	45	20	900
B-1B (Penetrate)	97	20	2,328
Subtotal:	246		5,308
START Count	246		1,101
True Total: SNDVs Warheads	1,299		10,207
Total: START Count	1,299		6,000
SSBNs	*SSBNs*	*SLBMs/SSBNs*	*Missiles*
Trident II	17	24	408

Rationale behind the Best Force Mix

The objective behind the force mix listed in table 9 is to achieve the best mix of strategic forces for the United States given the anticipated START constraints. The combination of forces is designed to maximize the benefits of each system, while at the same time minimizing individual weaknesses. The force is designed to be able to achieve the national security objectives mentioned in chapter 1, for a force which cannot achieve these objectives is one which the United States cannot allow.

Let us now examine each leg of the Triad in its post-START structure (as presented in table 9) and discuss the impact of the reductions in numbers of each leg in terms of the considerations put forth in chapter 3.

Intercontinental Ballistic Missiles

The ICBM force specified in table 9 will provide a force with a greater chance of survival, at least in the opinion of this author, through the deployment of mobile systems. The portion of the force which would be silo based could be placed in silos superhardened to about 25,000 psi. This superhardening would force the Soviets to increase the accuracy of their weapons to achieve a reasonable expectation of destroying the weapon in the silo. Following the formula for single-shot kill probability in chapter 1, an SS-18 would have to have a CEP of about 100 feet to achieve an SSKP of 90.[5]

The rail-garrisoned Peacekeeper force would be positioned on 25 trains with two missiles per train. The trains would be flushed out into the rail network upon strategic warning. If the trains are unable to be dispersed and are taken by surprise in an attack without warning, the numbers which would be lost would not degrade the nation's strategic forces to any great extent. A maximum of 500 warheads could be lost, and the likelihood that the attack would achieve a 100-percent kill probability against the RGPK force is small.

The mobile force of small ICBMs could be dispersed on existing US bases at locations in the north central region of the United States. Basing this way would reduce the probability of a successful short time of flight attack from SLBMs positioned along either US coast, and the dispersal pattern would make the targeting problem for the Soviets very difficult. Ideally, the SICBMs would be moved at frequent and random intervals to further complicate the Soviet targeting problem. The SICBMs could be further dispersed in periods of heightened tension, thereby increasing their probability of survival during an attack.

The impact of the reductions on the ICBM leg of the Triad would be minimal. Although only 95 missiles would be based in silos, and the support forces for missile silos would be reduced, there would also be a need for support and operating personnel for the new mobile systems. As mentioned in chapter 3, the secretary of defense estimated that 8,500 people would be required to operate and maintain the SICBM force. The 25 trains for the RGPK force would probably require a sizable number of personnel for operation and maintenance. Thus, the people who would no longer be required for the eliminated ICBMs could be retrained to operate and maintain the SICBM and RGPK force.

In all, the ICBM force would be reduced from 1,010 missiles to 645 (a 36-percent cut), and the associated warhead count would be reduced from 2,480 to 1,635 (a 34-percent cut). The overall ICBM force SSKP average, against a 5,000-psi target, will increase from 56.71 to 61.14 (assuming the SICBM to have the same CEP and yield as the Peacekeeper missile, and that

Minuteman III has no improvement in accuracy or increase in yield). Therefore, the force would be more deadly (through increased accuracy), more survivable, more able to endure after an attack, and more reliable, and still able to maintain its high level of connectivity. It would also be more cost-effective than the current ICBM force. This type of ICBM force mix could provide US planners with greater flexibility and allow the NCA a greater number of employment options. The combination of mobile systems and superhardened silos should greatly reduce the need (or appeal) of any type of LOW/LUA policy being utilized, thereby contributing to crisis stability.

Submarine-Launched Ballistic Missiles

The SLBM force would probably take the smallest cut. The planned fleet of 20 Trident SSBNs would be cut to 17 (a 15-percent cut). The Trident II weapon system would still provide maximum survivability, endurability, accuracy, reliability, and cost-effectiveness. With the recent improvements to the command and control links, the connectivity of the SSBNs is nearing the level of the ICBMs.[6]

Practically speaking, reduction of SSBNs to 17 is almost artificial. With only eight Trident SSBNs operational at the time of this writing (early 1989), and one in final testing and acceptance, it will be many years before the numbers of SSBNs approaches 17.[7] The planned procurement rate of one Trident SSBN per year would bring the Trident force level to 17 in 1997.[8] As long as START is finalized before 1997, there should be little or no impact on the SSBN programs.

Bombers

Although the author has attempted to remain objective in the determination of what is the best strategic force mix for the United States, it is difficult to place a great importance on the manned bombers because of their vulnerability to attack while on the ground, as well as to defensive systems while airborne. The bomber force mix presented in table 9 is made up of the residual numbers available after the ICBM and SLBM legs of the Triad are maximized to the extent of the START proposals (i.e., 4,900 ballistic missile warheads). Not discounting the importance of the manned bombers in locating and destroying mobile targets, it is very difficult to compare these systems with the reliability of ballistic missile systems in delivering weapons to designated targets.

The proposed force is made up of both standoff and penetrating B-52s and B-1Bs. Since the B-1B has been designed as a penetrating bomber, it has only been assigned a penetrating role. The small number of penetrating B-52s is a result of the number of standoff B-52s. With only 97 B-1Bs (97 warheads by START count), the numbers of B-52s seemed to be maximized by assigning 45 B-52s to standoff roles (900 warheads) and using the remaining 104 in a penetrating role (104 warheads by START count). This results in a START count of 246 bombers and 1,101 warheads, with an actual count of warheads being 5,308.

The bomber force would be reduced from 291 bombers to 246 (a 15-percent reduction). This reduction would be made entirely by eliminating, or converting, the oldest bombers and utilizing only the most modern strategic systems available. Should the B-2 program continue and be successful, B-2s would be expected to replace the B-52s and complement the B-1Bs. The B-1Bs would then be likely to shift from penetrating to standoff roles, allowing the B-2 to perform the penetrating missions. A 15-percent reduction in forces should have little overall affect on the bomber force. There should be little reason to close bases and lay off large numbers of personnel.

Force Strategy

The overall objective of the force projection in table 9 is to maximize the criteria mentioned previously which make up a good force. In the opinion of this author, the force listed reduces the ICBM vulnerability issue through the introduction of mobile systems and superhardened silos; it maximizes the utility of the accurate and survivable Trident II missile by almost achieving the maximum allowable number (3,300) of SLBM warheads; it maximizes the overall numbers of allowable ballistic missiles (ceiling of 4,900 proposed); and it reduces the importance of manned bombers without great impact to the forces and without any apparent funding increases.

The force mix presented in table 9 is capable of fulfilling almost all possible strategies of the United States. It will provide the planners with a more flexible force since the previously vulnerable land-based ballistic missiles will be made more survivable through hardening or mobility. The planners will also have the first hard-target-kill SLBM system, with all of the associated advantages that SLBM systems have. The bomber leg will be comprised of the best possible mix of penetrating and standoff bombers that can be achieved without relying on stealth technology. The result of this is that the forces can perform their assured destruction roles and damage limitation roles; they can ride out an attack and endure long after it; they can provide maximum flexibility to the NCA in determining what type, if any, retaliatory strike is appropriate; and they can do this with only one leg of the Triad seeing any real program changes.

Additional START Issues

The Soviets have insisted so far that there will be no START without negotiating SDI. The United States has refused to include SDI in any START discussions. Possibly some arrangement to handle SDI along with new ABM talks could provide a solution to this impasse.

Assuming that START is consummated, and assuming the United States has developed the technology for some type of SDI missile defense system, the force structure could change radically. The SDI system could eliminate, or at least reduce, the possibility of ICBMs being killed in silos. It could also provide the United States population centers with at least some level of security. This would allow US strategic forces to stand almost entirely in a war reserve role. It would make it difficult, if not impossible, for the Soviets to formulate any scenario whereby their first strike would have any potential for disarming the United States. With the removal of the silo vulnerability issue, there would be no need for the expensive, single-warhead SICBM or the multiple-warhead RGPK system. A return to MIRVing silo-based ICBMs would be safe. Bomber survivability would be increased dramatically. As the SDI program appears now though, it will be some time before any type of system can be deployed, and the initial systems are likely to provide only a marginal degree of safety.

The issue of mobile systems appears to be easier to solve than SDI. The Soviets already have two mobile systems: the SS-24, rail-based system; and the SS-25, road-mobile system. The United States is pursuing RGPK and SICBM mobile systems. The high survivability of mobile systems should lend itself to deterring any type of first strike, as it is unlikely that any first strike would disarm either side. Therefore, it appears that the United States, as mentioned in chapter 1, may be backing down on its position of banning mobiles.

As an alternative to simply backing down from its insistence on banning

mobile systems, the United States could utilize them as a bargaining chip in the SLCM issue. If the Soviet Union were to decouple the SLCM issue from the START negotiations, for instance, the United States might withdraw its position against mobile systems. This quid pro quo would allow the United States to develop and procure systems already in the pipeline and, at the same time, would remove the SLCM issue as an obstacle to further progress toward a final START agreement.

As was briefly mentioned in chapter 3, the concept of extended deterrence may be affected by START. With forces reduced by about 50 percent, it would seem likely that the degree to which United States strategic forces could provide extended deterrence on behalf of its allies would be diminished. At least one author feels that START will have no effect on extended deterrence. Robert S. McNamara states:

> Because the reductions in START are so balanced and will enhance the overall survivability of U.S. strategic forces, and because the United States would still retain nuclear weapons numerous enough and flexible enough to support NATO strategy, the U.S. capability to use nuclear forces in defense of Europe would remain unchanged. Therefore, whatever role strategic nuclear forces now play in deterring the threat of Soviet conventional aggression—one that I regard as minimal—they would play an equal or greater role after they are adjusted to the treaty limits.[9]

There is no simple answer to how much, if any, impact the START negotiations might have on extended deterrence. Like other issues such as targeting and weapons assignment, extended deterrence must be prioritized among the other national goals and objectives.

Conclusions

Assuming that some of START is finalized in the next few years, could both sides continue to reduce weapons to even lower limits? If reduced beyond the expected 6,000 warhead limit, would either the Soviet Union or the United States feel secure? At least one open source states that the next step for further reductions would be the 3,000 warhead level.[10] Reflecting on the complexities encountered in a reduction to the 6,000 warhead level, this author would expect to see many changes to force policy, structure, employment, and targeting strategy if a reduction to 3,000 warheads is ever planned. The question that must be answered is whether a force of 3,000 warheads would suffice to maintain the national security objectives and thus be in the nation's best interest.

Based on the evidence presented above and a review of the reference used in preparing this paper, it appears likely that some type of START will be negotiated in the next few years. The impact of strategic nuclear force reductions would be minimal in that the reductions are not likely to alter every leg of the current Triad to a great extent. The ICBM leg is likely to feel the biggest change if the United States is willing to make the investment in mobile systems. SLBMs will feel no real change in their programs, and bombers may only be forced to retire (or convert to conventional duty) about 50 aircraft. Current targeting policy should not require any significant revision, but the target data base and target plans will probably have to be reprioritized as the number of targets grows proportionally to the reduced force. Both the Soviet Union and the United States have the opportunity in START to modernize their forces and end up with force mixes which can have an overall better hard-target-kill capability and be more survivable to any attacking force. In sum, the findings of this paper indicate that START will have little chance of creating an adverse effect on either United States or Soviet strategic nuclear forces, therefore, with the excep-

tion of few relatively minor issues, a START deal appears imminent.

The conclusions that this author has come to, and supported with the body of this paper, are as follows:

1. The United States should continue to pursue mobile ICBM systems in general, and in particular the SICBM. The RGPK proposal will give the ICBM more survivability than a silo-based missile, but it will present a very tempting target to Soviet planners with 10 warheads per missile and with two missiles per train, that system could potentially lose 20 warheads with one direct hit from a single Soviet warhead.

2. The United States should de-emphasize the manned bomber for strategic nuclear weapons delivery because of its vulnerability to incoming weapons (while on the ground) as well as to air defense systems (while airborne). The United States should stop development of the B-2 stealth bomber and rechannel strategic funding into mobile ICBM systems.

3. START will have little or no effect on the SLBM leg of the Triad. A force of 17 Trident SSBNs equipped with Trident II (D5) missiles will present a formidable force and will provide planners with greater flexibility in target assignment and weapon employment policies.

4. START limitations, as specified in chapter 1, do not present the United States with limits which will adversely affect its strategic forces. The force mix presented in table 9 clearly demonstrates that, although the force will be reduced, it will be more survivable, more accurate, more able to endure, and more cost-effective than the current force structure.

5. As exemplified in the force mix proposed in table 9, the START limits will not cause the United States to fail to meet its most pressing national security objectives. In fact, the national security objectives should be met with reduced forces without many changes to existing strategies. The weapon ceilings which may come with the signing of START will still allow the United States to design a robust strategic nuclear force capable of securing the national interest. Therefore it is this author's conclusion, that the START negotiations should continue and all obstacles overcome in order to achieve a completed START agreement. A completed START, if near to the proposed form presented in chapter 1, is in the best interest of both the United States and the Soviet Union. This is true because the resultant forces would be smaller, thereby reducing the possibility of accidental launching; more cost-effective in that they will be more survivable; and more accurate, thus making them more flexible to planners. The reduction in forces may also present some monetary savings by eliminating the maintenance of aging systems. These savings are likely to be offset, however, by the rising costs of newer, more complex and more reliable systems.

The force mix presented in table 9 is but one example of the type of force mix which could be constructed while staying within the current START proposal limitations. Many other force mixes could be constructed with emphasis on different systems. The flexibility which these limitations still allow is the primary reason why the START negotiations should continue. When either side can maintain their nation's security, and thus their national interests, while at the same time reducing their strategic nuclear arsenals, it is in the best interest of these nations to do so. Pursuing an agreeable START should culminate in achieving these reduced forces without reducing either nation's security.

Notes

1. Congressional Budget Office, *Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives* (Washington, D.C.: Government Printing Office, 1983), 21–23, 99–110.

2. *Jane's Weapon Systems 1988–89* (Alexandria, Va.: Jane's Information Group, Inc., 1988), 22, 26.

3. For a description of SSBN command and control links, see W. J. Holland, "The Link to the Boomers: The Triad's Best!" US Naval Institute *Proceedings* (January 1988): 41–50.

4. No accuracy figures could be found for bombers performing in a penetrating role. It is assumed that with state-of-the-art electronics, the bomber can place a bomb on the target with relatively good accuracy.

5. An alternative to increasing accuracy is to increase the yield of the warhead. To achieve an SSKP of 90 with the current CEP, an SS-18 would need a yield of 17 megatons.

6. Some might argue that the command and control links for the SSBNs are better and more reliable than for either bombers or ICBMs.

7. Frank C. Carlucci, *Fiscal Year 1989 Annual Report to Congress* (Washington, D.C.: Government Printing Office, 1988), 235.

8. Ibid.

9. Robert S. McNamara, "The New Administration and the Future of Arms Control," *Arms Control Today* 18, no. 10 (December 1988): 5.

10. Michael M. May, George F. Bing, and John D. Steinbruner, *Strategic Arms Reductions* (Washington, D.C.: Brookings Institution, 1988), 6–7.

GLOSSARY

ABM	antiballistic missile
ALCM	air-launched cruise missile
ASW	antisubmarine warfare
ATB	advanced technology bomber
CEP	circular error probable
CRS	Congressional Research Service
EPW	earth-penetrating warhead
ICBM	intercontinental ballistic missile
IOC	initial operational capability
IRBM	intermediate-range ballistic missile
LNO	limited nuclear option
LOW	launch on warning
LUA	launch under attack
MAO	major attack option
MIRV	multiple independently targetable reentry vehicle
NCA	national command authorities
OB	order of battle
OMT	other military targets
RAO	regional attack option
RGPK	rail-garrisoned Peacekeeper
RV	reentry vehicle
SALT	Strategic Arms Limitation Treaty
SAM	surface-to-air missile
SAO	selective attack option
SDI	Strategic Defense Initiative
SICBM	small intercontinental ballistic missile
SIOP	single integrated operational plan
SLBM	submarine-launched ballistic missile
SLCM	submarine-launched cruise missile
SNDV	strategic nuclear delivery vehicle
SNF	strategic nuclear force
SRAM	short-range attack missile
SRT	strategic relocatable target
SSBN	fleet ballistic missile submarine (nuclear-powered)
SSGN	guided-missile submarine (nuclear propulsion)
SSKP	single-shot kill probability
SSN	submarine (nuclear-powered)
START	Strategic Arms Reduction Talks

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- "Countering Terrorism in the Late 1980s and the 1990s: Future Threats and Opportunities for the United States." Dr Stephen Sloan. 1987. Public release.

Brief overview of the terrorist threat, the types of terrorist groups, and the alternatives for countering terrorism. (This paper is a revision of a presentation made on 4 April 1987 at the program—titled Threats and Opportunities Facing the United States in the 1990s—that was held under the auspices of the Consortium for the Study of Intelligence, National Strategy Information Center, Washington, D.C.) (AU-ARI-CP-87-5)

- "The Changing Western Alliance in the South Pacific." Wing Comdr Brian L. Kavanagh, RAAF. 1987. Public release. Examines the Western alliance, its history and objectives, and the issues confronting it. The author analyzes current policies of Australia, New Zealand, and the United States (ANZUS) and these nations' perceptions of the ANZUS Treaty. A blueprint for change is suggested. (This paper was originally a research report submitted to the Air War College faculty in fulfillment of the research requirement for Wing Commander Kavanagh of the Royal Australian Air Force.) (AU-ARI-CP-87-4)

- "Aerial Refueling: The Need for a Multipoint, Dual-System Capability." Maj Marck R. Cobb, USAF. 1987. Public release. Investigates the possibility of using multipoint, probe, and drogue refueling to alleviate tanker shortfall and to increase the effectiveness of tactical fighter operations. (AU-ARI-CP-87-3)

- "Air Power and the Defeat of a Warsaw Pact Offensive: Taking a Different Approach to Air Interdiction in NATO." Lt Col Price T. Bingham, USAF. 1987. Public release. A penetrating look at the present US Air Force approach to air interdiction in NATO, its flaws, and its weaknesses. An alternate approach, the use of the family of air scatterable mines (FASCM) integrated with the intelligent maneuver of NATO land forces for an air interdiction campaign, is presented along with a look at the problems to be overcome before the US Air Force could effectively use FASCM for air interdiction. (AU-ARI-CP-87-2)

- "The Swords of Armageddon: A Discussion of the Strategic Mystique." Maj G. E. Myers, USAF. 1987. Public release. This discussion attempts to dispel the continuing mystique linking strategic bombardment with nuclear holocaust. It addresses the relevance of individual strategic actions to large, small, nuclear, and nonnuclear wars and of our bombers and intercontinental missiles as viable force options in a variety of scenarios. (AU-ARI-CP-87-1)

- "Rolling Thunder 1965: Anatomy of a Failure." Col Dennis M. Drew, USAF. 1986. Public release. Illustrates how US air power was not prepared for the conflict in Vietnam because of its emphasis on strategic bombardment and how the war's outcome may not have been any different even if the military had been allowed to carry out its desired intensive bombing campaign. (AU-ARI-CP-86-3)

- "Policy and Strategy Foundations for Low-Intensity Warfare." Jerome W. Klingaman. 1986. Public release. Addresses the need for establishing a policy framework on the internal dynamics of revolution to serve as a foundation for developing defense strategies, doctrines, and force structures for this type of warfare. (This paper was originally presented on 21 June 1986 to an international forum on Low-Intensity Warfare in Paris, France.) (AU-ARI-CP-86-2)

- "Nuclear Winter: Asymmetrical Problems and Unilateral Solutions." Lt Col Fred J. Reule, USAF. 1986. Public release. Through analysis of the asymmetries of nuclear winter, this study uncovers the nature of the problem we face and explains why joint efforts to solve it are in the best interests of both superpowers. (AU-ARI-CP-86-1)

- "Study War Once More: Teaching Vietnam at Air University." Maj Suzanne Budd Gehri, USAF. 1985. Public release. A penetrating look at how Air University's professional officer schools teach the lessons from the Vietnam War and a comparison of their approach to those employed by civilian institutions of higher learning. (AU-ARI-CP-85-7)

- "Project Control: Creative Strategic Thinking at Air University." Lt Col David J. Dean, USAF. 1985. Public release. A unique review of a little-known strategic research project conducted at Air University during the early 1950s. (AU-ARI-CP-85-6)

- "A Possible Fallback Counteroffensive Option in a European War." Dr Richard B. Remnek. 1985. Public release. A new look at the European situation and a new proposal for countering a possible Soviet attack. (AU-ARI-CP-85-5)

- "Some Observations on Islamic Revolution." Dr Lewis B. Ware. 1985. Public release. A knowledgeable look at Islamic fundamentalist revolutions, their roots, and their implications. (AU-ARI-CP-85-4)

- "Military Art and the American Tradition: The Vietnam Paradox Revisited." Lt Col Dennis M. Drew, USAF. 1985. Public release. Brief examination of the American strategy in Vietnam and traditional American military views about the art of warfare. (AU-ARI-CP-85-3)

- "Marlborough's Ghost: Eighteenth-Century Warfare in the Nuclear Age." Lt Col Dennis M. Drew, USAF. 1985. Public release. An essay examining the similarities between limited warfare in the eighteenth century and the age of nuclear weapons. (AU-ARI-CP-85-2)

- "Airpower in Small Wars: The British Air Control Experience." Lt Col David J. Dean, USAF. 1985. Public release. A brief examination of the concept of "air control" as practiced by the RAF in the Middle East between the two world wars. (AU-ARI-CP-85-1)