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The Triad– A Relook

Should The United States Retain its Land Based ICBM Force ?

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A Monograph
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ABSTRACT

THE TRIAD - A RELOOK - SHOULD THE UNITED STATES RETAIN ITS LAND BASED ICBM FORCE? by Colonel John D. Skelton, USA, 52 pages.

The United States has maintained a Triad of strategic nuclear delivery systems since the early 1960's. This Triad includes strategic bombers, intercontinental ballistic missiles (ICBM), and submarine launched ballistic missiles (SLBM). The redundancy and mutual support provided by the Triad provided the United States with a credible nuclear deterrent during the Cold War confrontation with the Soviet Union. Each element of the Triad has distinct attributes for deterrent and warfighting roles. In the emerging aftermath of the Cold War it is appropriate to determine if the United States needs to retain its ICBM force of 1,000 missiles. This study reviews the evolution of the Triad and U.S. nuclear strategy, and examines the continuing need for the ICBM force against the following criteria: threat, alternatives to the ICBM, the advantages and disadvantages to retaining the ICBM capability, and the impact of the Strategic Arms Reduction Treaty (START) on the ICBM force? This study determines that the threat issue is the dominant criteria and concludes that the United States can sometime in the not too distant future retire most of its ICBM force, but first must negotiate with the former Soviet republics to achieve a significant reduction or total elimination of their strategic nuclear forces. Although those fledgling new republics should have no desire to threaten the United States, the existence of their vast nuclear capabilities, particularly ICBMs, must be seriously considered by U.S. defense planners.

TABLE OF CONTENTS

The Triad - A Relook

Should the United States Retain its Land Based ICBM Force?

INTRODUCTION

> The redundancy and mutual support provided by the Triad ensures that our strategic forces are a credible deterrent... The Triad provides a flexible, survivable, dispersed, and responsive force that is fundamental to our deterrence strategy. ICBM [intercontinental ballistic missiles] are reliable and can respond immediately; SLBM [submarine launched ballistic missiles] are survivable and dispersed; and strategic bombers are flexible.
>
> 1991 Joint Military Net Assessment[1]

The United States has relied upon a strategic triad of bomber aircraft, submarine launched ballistic missiles, (SLBM) and land based intercontinental ballistic missiles (ICBM) for the past three decades to deter the Soviet Union from attacking the United States or its allies. The Triad has accomplished deterrence by maximizing the unfavorable uncertainties which Soviet leaders would face in planning an attack.[2] However, by late 1991, the Soviet threat was greatly diminished and, in fact, the Soviet Union had ceased to exist as an international political entity. The decline in the threat posed by the Soviet Union was recognized by President Bush on 28 September 1991 when he ordered 450 nuclear missiles and 280 strategic bombers off their "alert" status.[3] In late December 1991, the Soviet Union was dissolved and replaced by three independent Baltic States, an independent Georgia, and a Commonwealth of Independent States composed of eleven of the former Soviet Union's republics.[4]

strategic Triad. This is a relevant and significant strategic issue as the Cold War, which provided the impetus for developing the Triad, recedes into history. In looking at this issue the researcher must confront the "... religious-like aura [which] has surrounded the strategic Triad."[5] After all, conventional wisdom holds that the strategic nuclear Triad deterred the Soviets from overt aggression in Europe or against the United States for over thirty years. Future historians will have to refute or confirm that wisdom. However, that conviction has been and still is a basic assumption underlying United States defense strategy.[6] I have selected the ICBM leg of the strategic Triad for the focus of this study because it has been the single most visible component of the Triad.

There are currently 1000 intercontinental ballistic missiles deployed in underground silos in the Continental United States.[7] The disintegration of the Soviet threat and a growing domestic demand to divert defense dollars to underfunded domestic and social programs subject all aspects of the Department of Defense budget, including the Triad, to a thorough fiscal review. Add these pressures to on-going arms control initiatives and one can discern the possibility that the sanctity of the Triad can now be challenged.[8]

In this paper I will describe the Triad, trace its evolution with emphasis on ICBM development and then review the evolution of U.S. nuclear theory and strategy. I will then consider four criteria to determine if the United States still needs the ICBM

component of the Triad. These criteria include the following considerations:

a. What threats dictate the need for the United States to retain the ICBM capability?

b. What are alternatives to retaining the ICBM capability?

c. What are the advantages and disadvantages to retaining the ICBM capability?

d. What is the impact of the Strategic Arms Reduction Treaty (START) on the ICBM force?

The Strategic Triad

The Triad, formally called the Strategic Offensive Forces of the United States, includes the assets listed below:[9]

Land-Based ICBMs
- Minuteman 950
- Peacekeeper 50

Strategic Bombers
- B-1B 90
- B52G/H 154

Fleet Ballistic Missile Launchers (SLBM)
- Poseidon (C-3 and C-4) 368
- Trident 288

The table above does not include the FB-111, a medium-range bomber, capable of flying at supersonic speeds. There were about sixty of these strategic/theater bombers in operation with the Strategic Air Command (SAC) in 1990.[10] The figures above represent launchers or delivery systems, not warheads. Many of these delivery systems can deliver multiple warheads. The Navy and the Air Force both continue to possess "non-strategic" nuclear weapons

which can also complement strategic nuclear weapons in the foreseeable future. There are over twenty thousand nuclear warheads available in the United States inventory for delivery against an adversary's homeland by the Triad.[11]

America's nuclear Triad evolved from the hysteria of the now discounted bomber and missile gaps of the late 1950's and early 1960's. By 1960, both the Soviet Union and the United States possessed nuclear weapons capable of delivery by land based missile, strategic bomber, or submarine launch.[12] By 1990 the United States maintained numerical advantages in the categories of bombers and warheads and sea-launched missiles and warheads over the Soviets. However, the Soviets in 1990 continued their two decade old superiority in total numbers of land launched missiles and warheads.[13] Former Secretary of Defense, Harold Brown, speaking of the Soviet proclivity to expand its strategic missile force, once said: "when we build, the Russians build, when we stop--the Russians build."[14]

United States strategic offensive forces are deployed at a variety of operating bases in the United States. There are sixteen bases which currently serve as homes for the strategic bombers, while there are six bases which contain the nation's intercontinental ballistic missiles buried in underground silos. Three Navy bases, one in the northwest of the United States and two in the southeast serve as homes for the nation's ballistic missile launching submarines.[15] Some of these bases along with a submarine

base at Holy Loch in the United Kingdom are slated for deactivation in whole or part during the next few years.

The land based ICBMs and the strategic bombers have until recently been assigned to the Strategic Air Command headquartered at Offut Air Base near Omaha, Nebraska. That command has been designated for deactivation and will be replaced by the Strategic Command which will command all the components of the nation's Triad.[16] Prior to this time, the Navy's fleet ballistic missile submarines have been commanded by the Navy, but they and the Army's nonstrategic nuclear forces were included in the Single Integrated Operational Plan (SIOP), the master targeting plan for nuclear weapons, first drawn up in 1960.[17] In response to President Dwight D. Eisenhower's 1958 State of the Union address, calling for greater unity in strategic planning and control, the Joint Strategic Target Planning Staff (JSTPS) was established in 1959.[18] The SAC commander was designated to serve as the director with a Navy admiral as his deputy. When created, the JSTP staff included 219 SAC members, 29 Navy representatives, 10 Army seats, 8 non SAC Air Force slots, and 3 Marine members.[19]

Over the years, since 1960, there have been many calls to improve the nation's Triad to keep abreast of advances being made in the Soviet Union's strategic nuclear capabilities. Currently the United States possesses an awesome capability to deliver nuclear weapons in anger at the Soviet Union or more correctly the former Soviet Union. Whether or not that capability could survive a first strike from the Soviet Union and still deliver a nation

destroying nuclear counterstrike has often been the focus of the nation's defense debate. This debate gets to the survivability issue as the heart of the Triad rationale:

> The United States has developed a strategic Triad of ICBMs, SLBMs, and bombers, providing flexibility and survivability which hedge against unforseen developments that might threaten U.S. retaliatory capabilities. Specifically, each leg of the Triad has unique capabilities that complement those of the others. Silo-based ICBMs provide great promptness and accuracy. SLBMs provide survivability, flexibility, and endurance. Bombers provide alert launch survivability, recallability, and employment flexibility.[20]

In 1990, 35% of the nations strategic nuclear warheads were allocated for its strategic bombers, while 20% of its warheads were committed to the ICBM force. A substantial 45% of its warheads were devoted to the SLBM program.[21] Overall, by late 1991, the United States Strategic Nuclear Triad had evolved into a relatively balanced force. The Triad constitutes a very credible nuclear deterrent force with a robust capability to inflict unacceptable damage to the Soviet Union if that nation's leadership ever initiates an attack on the United States or its allies.

Should deterrence fail, the mission of United States strategic forces would be to control escalation and to terminate the conflict at the lowest possible level of violence.[22] To carry out its wartime mission the strategic bomber leg of the Triad can carry gravity bombs, short range attack missiles (SRAMs) or air launched cruise missiles. The other two legs of the Triad, ICBMs and SLBMs, carry multiple independently targetable warheads, except for Minuteman II missiles, which carry a single warhead.[23] The Triad

evolved in the 1950's and 1960's during the Eisenhower and Kennedy administrations.

EVOLUTION OF THE TRIAD

The Bombers

The United States closed out World War II and entered the atomic age with its atomic bomb attacks on the Japanese cities of Hiroshima and Nagasaki in August of 1945. Those two attacks each involved dropping a single atomic bomb from a B-29 "Superfortress" aircraft. Following the end of World War II the United States, basking in the afterglow of its stunning victories in Europe and the Pacific, hastily demobilized its vast military organization and arsenal. However, by the winter of 1946-47 the United States began to realize that its intended policy of cooperation with the Soviet Union was breaking down in the face of Soviet expansionism in Europe and elsewhere.[24] This realization contrasted significantly with an earlier 25 July 1946 assessment by the then recently created Strategic Air Command "[that] no major strategic threat or requirement now exist nor...will such a requirement exist for the next three to five years."[25]

The fledgling Strategic Air Command's 1946 concept of operations called for centralized control of its global strategic bomber force with periodic rotations of bomber, long-range escort fighter, and reconnaissance groups from home bases in the United States to forward bases in the North Atlantic, North Pacific, and Far East. The wartime plans of the day assumed that the small

number of atomic-capable B-29s would be employed either as a part of a larger force of conventional bomb carrying B-29 Bombers or as individual aircraft that would attack enemy targets at night or under the cover of bad weather.[26]

However, on the eve of the start of the post World War II Cold War ideological confrontation, America's publicly vaunted strategic nuclear capabilities were, in fact, very limited. In late 1946, the Strategic Air Command had only two B-29 bomber groups that were fully combat ready.[27] However, over the next few years the Strategic Air Command greatly increased the number of bomber groups mostly using aircraft left over from World War II. In September 1947, General George C. Kenney, the first SAC commander, reflected a prevailing belief of air strategists of his day, when he concluded:

> as the initial enemy blow will come from the air and be delivered by [Soviet] air power, the answer must be for us to maintain our air power strong enough to deter any possible enemy from attacking us.[28]

In the tense years of the late 1940's, the strategic bomber leg of what would become the Triad was firmly established. Actually, with a greatly reduced military force after the post World War II demobilization, the only way that the United States could respond to Soviet aggression or intimidation in Europe was the use or threat to use nuclear capable strategic long range bombers such as the B-50, an improved version of the B-29, and the huge B-36 bomber. These bombers were replaced by the jet engined B-47 and the B-52 in the 1950's. While improved versions of the

venerable B52 still remain in service today, the B-47 was completely withdrawn from SAC service by 1967.

In the early 1960s, Secretary of Defense, Robert S. McNamara, directed the accelerated retirement of the B-47s because he wanted to rely on the use of ICBMs rather than manned bombers.[29] Indicative of the early strategic emphasis placed on the manned bomber concept is the fact that over 2,200 B-47 bombers were acquired. The number of those aircraft in service peaked in early 1957 with 28 medium bomb groups flying 45 bombers each.[30]

The bomber leg of the Triad has employed other aircraft over the years including the supersonic B-58 from 1960 to 1969 and the FB-111 from 1968 to 1990. The B1-B bomber entered service in 1986 as a long range strategic bomber designed to carry almost twice the weapons payload as the B-52.[31] Whether or not the next generation of strategic bomber, the B2 Advanced Technology Bomber (ATB) "Stealth" low observable strategic bomber, will be procured in operationally significant quantities is uncertain at this time because of its high cost and the decline of the Soviet threat for which the B2 was originally conceived and designed.

Emergence of the strategic bomber as the initial component or leg of what would become the Triad was a logical outgrowth of the World War II experience. That historic conflict witnessed the destructiveness of air power that Guilio Douhet had prophesied twenty years earlier. The introduction of atomic warheads, such as those visited upon the Japanese homeland, simply meant that in the new atomic age of warfare, one lone bomber could destroy a city.

Raids of hundreds of bombers carrying conventional warheads to destroy a city or key military facility were no longer necessary. The destruction of cities by bombing had become more efficient with the advent of the atomic bomb.

The Intercontinental Ballistic Missiles ICBMs

In the midst of the massive post World War II demobilization, the War Department issued a directive on 7 October 1946 which made the Army Air Forces responsible "for the research and development pertaining to guided missiles."[32] Interest in the battlefield potential of ballistic missiles stemmed from the German successes with their V-2 rockets in the later stages of World War II. One hundred V-2 rockets, confiscated by the United States Army from German depots after the war ended, were shipped to the U.S. Army White Sands Proving Grounds in New Mexico for firing, testing, and evaluation under the aegis of Project Hermes.[33]

Using monies left over from wartime accounts General Henry H. "Hap" Arnold initiated several research projects on the study of future warfare technologies. Some of this money was used to create what eventually became the nonprofit Research and Development (RAND) corporation. One of the most significant programs started through General Arnold's initiative was the MX-774 Hiroc intercontinental ballistic missile.[34] This project called for a study to explore the development of a 5,000 mile range intercontinental ballistic missile. However, almost at once this ambitious project encountered problems. There were many technical and engineering problems related to the program. Applying lessons

and technology from the German 250 kilometer range V2 rocket program to a 5,000 mile Hiroc program was a substantial step. There were some prominent nay sayers. One was Doctor Vannevar Bush, Chairman of the Joint [War Department and Navy Department] Research and Development Board. While testifying before the Senate Committee on Atomic Energy in December 1945, "he completely discounted the technical feasibility of [the]...intercontinental rockets."[35]

There were many challenges and problems faced in developing the ICBM in the mid to late 1940's. These included competition for limited "missile dollars" among a variety of missile programs such as air to air missiles, surface to air missiles, and stand-off bombing missiles. Also there were great technological hurdles to overcome in propulsion, guidance, payload, fuel, and materials. Understandable resistance to ICBMs emerged from some of the "bomber generals" then running the Army Air Forces and later the Air Force. However, there was also the recognition by Lieutenant General Ira C. Eaker, Deputy Commanding General of the Army Air Forces in 1947 that:

> [the United States] should...spend the necessary experimental funds to ensure that we are the first in the field with a long range guided missile which may be the primary weapon at some future date, but probably not within fifteen years.[36]

In 1947, the MX-774 intercontinental ballistic missile contract with the Consolidated-Vultee Company (later part of the General Dynamics Corporation) was terminated in large measure due

to insufficient appropriations. However, the ill-fated project produced important results:

> The Consolidated-Vultee work had arrived...at three important innovations: the use of the missile body as the wall of the fuel tanks as a weight-saving measure, the employment of swiveling rocket engines to provide directional conflict in flight, and the development of a nose cone that could be separated from the main missile body...The results were so favorable that...key members of the MX-774 engineering team [were kept] together to continue studies of ballistic missile systems.[37]

Despite these promising possibilities, ICBM research and development in the United States during the 1945-1950 period lacked a real sense of urgency. After all, "[the Americans] had the long range bomber [the B-50 and the B-36] that could carry the atomic bomb [and] the Soviet Union had neither [until 1950]."[38]

As a result of both the absence of a perceived need for an ICBM and austere defense funding, the long range ballistic missile program in the United States between the critical years of 1945 and 1950 languished. Such was not the case in the Soviet Union. The start of the Korean War and the Soviet development of a nuclear capability jolted America's complacency in developing an ICBM.[39] The United States Army in 1951 initiated development of the Redstone missile which was originally designed to have or 450 mile range. Although the range was reduced to 200 miles when a heavy thermonuclear warhead was developed for the missile, the success of the Redstone project clearly demonstrated the feasibility of developing future missiles with increased range and payload potential.[40]

In early 1953, the special assistant to the Secretary of the Air Force for research and development, Trevor Gardner, "actively supported the development of an intercontinental [ballistic] missile."[41] His efforts received a considerable boost in 1954, when a RAND Corporation report observed:

> Unusual urgency for a strategic missile capability can arise from one of two principal causes: A rapid strengthening of the Soviet defenses against our SAC manned bombers, or rapid progress by the Soviet in his own development of strategic missiles which would provide a compelling political and psychological reason for our own effort to proceed apace. The former is expected during the second half of this decade [and]...evidence exists of an appreciation in this [ICBM] field on part of the Soviet...while the evidence may not justify a positive conclusion that the Russians are ahead us, a grave concern...is in order.[42]

Starting in 1954, the Air Force energetically pursued development of its first operational ICBM system, which was designated Air Force weapon system 107A and became more widely known as the Atlas. To oversee the missile development and procurement program for the Air Force a Special Aircraft Project Office, later named the Ballistic Missiles Office, was activated.[43]

Prior to the Spring of 1955, the Eisenhower administration, while aware of Soviet interest in the ICBM field, believed that the Soviets would not have the technology to counterbalance American strategic superiority until late in the 1960's. This assumption was shattered on 14 February 1955 by a report from the Technological Capabilities Panel of the President's Science Advisory Committee, also known as the Killian Committee after its

chairman, James R. Killian. The Killian Report expressed a "deep concern" about the vulnerability of North America to surprise attack by Soviet strategic bomber aircraft. Killian's report, endorsed for the most part by the National Security Council in October of 1955, recommended the highest national priority be extended to the development of the intercontinental ballistic missile.[44] The report also recommended that both land and ship based intermediate range ballistic missiles be "considered essential to national security."[45]

From this sense of urgency the Atlas, Titan, Jupiter, and Thor Missile programs were given the highest priorities. The Atlas with a range of over 10,000 miles was the first United States intercontinental ballistic missile to achieve operational status with a limited operational capability in 1958 and full capability in 1960.[46] Atlas was operational till 1965, when it was replaced by Titan and Minutemen missiles. The Jupiter and Thor intermediate range ballistic missiles (IRBM) were both developed along with the Atlas missile and shared some technology and components with the bigger missile. The Jupiter was deployed to Italy and Turkey, while the Thor was based in England. Both were withdrawn from service by 1965.[47]

The American ICBM program was given an unexpected boost on 4 October 1957, when the Soviet Union launched the world's first man-made satellite. This event shocked the American psyche in two ways. One way was simply the fact that the Soviets had beaten us in the race in space. The other, and perhaps more ominous, was the

realization that the Soviets now had powerful rockets, ICBMs actually, that could potentially threaten the continental United States. Although the Soviet R-7 missile used to launch the first Sputnik was not a particularly good missile for the ICBM role, it was, however crude, a working ICBM. It had already successfully flown over 5000 miles with a warhead in addition to launching a satellite into space. In late 1957, the United States had done neither.[48]

In response to the anxieties created by the launching of Sputnik, the Department of Defense approved the Air Force's proposal to continue development of the Titan missile to complement the Atlas system. Although there were funding concerns about a possible duplication of effort in fielding both Atlas and Titan, "bringing both [systems] into the combat inventory would provide more missile units in a shorter time and would maintain a larger production base for missiles."[49]

The Titan I missile became operational in April 1962 and was replaced by the Titan II in 1963.[50] The single warhead Titan II ICBM with a 9,300 mile range remained in active service until 1986.[51] The Titan II was deployed to missile silos in Arizona, Arkansas, and Kansas.[52]

After deciding to expedite development and deployment of the Atlas and Titan ICBM systems, the Department of Defense in early 1958 also approved an Air Force recommendation to proceed with development of a new ICBM, the Minuteman.[53] The Minuteman series was fielded in three successive variations starting in 1963.

Minuteman I was the U.S. Air Force's first solid-fuel rocket ICBM and is no longer in service. The Minuteman II, initially operational in 1966, still remains in service with 450 single warhead missiles deployed. Five hundred triple warhead Minuteman IIIs are currently deployed including 300 improved Minuteman III missiles with the highly accurate MK12A multiple independently targetable re-entry vehicle (MIRV). Fifty Minuteman IIIs with the MK12 warheads were deactivated in 1986 to provide silos for fifty new MX Peacekeeper missiles. Minuteman III silos were used because they were easier to convert to the MX requirement than were the older Minuteman II silos.

By 1977, there were 550 Minuteman III missiles in silos and 450 Minuteman II missiles in addition to 54 Titan II missiles on alert in the United States. At that point the American ICBM effort had reached its peak as a deterrence force.[54] The missile competition between the United States and the Soviet Union continued into the 1980's In response to concerns that the Soviets were getting significantly ahead of the United States in ICBM capabilities, the MX Peacekeeper ICBM was deployed in 1986. Concern about the Soviet lead in offensive first strike ICBM capabilities was expressed as late as September 1990 when the Soviet Military Power 1990 Report concluded:

> ...while the US ICBM leg [of the Triad] has the capability to deter a Soviet strike, it does not provide the same destructive capacity, destabilizing characteristics, or first strike capabilities as does its Soviet counterpart.[55]

The American ICBM effort started slowly following World War II. It gained momentum as visionaries realized that scientific, technical, and engineering advances, first demonstrated by the German V2 rockets that fell on England, could lead to missiles that could span the oceans. The development of smaller nuclear weapons that could be married to a missile for delivery to distant targets thousands of miles away revolutionized the way in which war could be fought. When the United States in the 1950's realized that the Soviets too were developing ICBM's capable of raining nuclear destruction on Europe and the continental United States, the nation committed its tremendous resources to creating a capable ICBM force to deter nuclear war.

In the Air Force of the late 1940's the senior leadership was mostly comprised of "bomber generals" from World War II. General Curtis Lemay captured the essence of their emotions when he stated:

> To say there is not a deeply ingrained prejudice in favor of aircraft among flyers...would be a stupid statement for me to make. Of course, there is...I believe we shouldn't discard a proven, reliable weapon system [the strategic bomber] or concept unless we have something that is able to replace it and do a better job.[56]

Despite that admitted prejudice the uniformed leaders of the Air Force and their civilian superiors led the United States into the ICBM age and created the second leg of the Strategic Triad. Concurrent with the developments in the ICBM area, the United States Navy was also working to create the third component of the Triad.

The Submarine Launched Ballistic Missiles (SLBMs)

While the Army was pursuing the development of intermediate range ballistic missiles and the Air Force was developing ICBM's in the 1950's, the U.S. Navy was also interested in ballistic missiles. As early as September, 1947, the Navy had launched a German V2 rocket from the deck of the U.S.S. Midway.[57] Navy interest continued and in 1955 the Navy collaborated with the Army on the Jupiter IRBM program. Initial Navy interest focused on launching missiles from the decks of surface ships. However, Rear Admiral William "Red" Raborn of the Navy's Special Project Office initi

ated a program to develop a submarine launched fleet ballistic missile capability.[58] There were many technical hurdles in reaching such a goal, not the least of which was the development of a reliable and safe solid fuel for the missile. As an outgrowth of Raborn's work the Navy established the Polaris submarine launched ballistic missile program.[59]

The Polaris was conceived to provide the United States with an extremely invulnerable retaliatory nuclear capability.[60] The overall deterrent value of the Polaris is often overlooked. By the end of 1960, the Soviet Union had fewer than thirty-five operational ICBM's, while the United States had deployed thirty-two Polaris and nine long range Atlas missiles in addition to a force of over 600 B-52 bombers and 1,400 B-47 bombers.[61] However, it was missiles that seemed to matter most in those years just after Sputnik when

there was an erroneous perception of a "missile gap" in favor of the Soviet Union. The Navy's ability to get the second generation technology Polaris into service promptly established that service as a full member of the Triad. Eventually the Navy acquired forty-one Polaris submarines.[62]

The Polaris SLBM was phased out and replaced by the Poseidon, a multiple-warhead missile capable of carrying up to 10 warheads, each capable of hitting a different target.[63] The Poseidon has undergone three major system upgrades in its lifespan to enhance reliability, range, and accuracy. The Trident I or C-4 missile entered service in 1980.[64]

The Navy's current SLBM capability is summarized below:

- 11 Lafayette-class fleet ballistic missile submarines (SSBNs) carrying the Poseidon C3 missile
- 12 Lafayette-class SSBNs carrying the Trident I C-4 missile
- 8 Ohio-class SSBNs carrying the Trident I missile
- 1 Ohio class SSBN carrying the Trident II D-5 missile

There are eight other Ohio class boats under construction. These will carry the Trident II D-5 SLBM.[65] The greatly improved accuracy of the Trident II has caused some arms control experts to view the system as a potentially de-stabilizing "first strike" weapon.[66] As the Trident II equipped Ohio-class boats are placed in service, older Poseidon submarines will be retired. When at sea, SSBNs are considered by the Department of Defense to be 100 percent survivable and are projected to remain so against foreseeable threats.[67]

The Navy's SLBM capability currently includes over 600 launchers all capable of firing multiple warheads. This constitutes a significantly awesome capability which has evolved over the past thirty years. Increased accuracy and range have resulted from a continuous research and development program which has shared technology with the ICBM program. In developing and acquiring its nuclear armed submarine launched ballistic missiles, the United States Navy established the third leg of the nation's Triad. The Navy also redressed its earlier fears that it was losing relevance in the post World War II nuclear age. Those fears had contributed to interservice rivalry which led to the "admiral's revolt" in 1948. That "revolt" occurred when the Navy leadership protested that too much reliance was being placed on the development of an Air Force dominated strategic bombing capability.[68] Determining how to employ the Triad required a parallel evolution of strategy.

EVOLUTION OF U.S. NUCLEAR STRATEGY

The preceding section focused on the evolution of America's Triad; this section will review the evolution of nuclear strategy which was directed at defining the roles and missions to be accomplished by the Triad. Bernard Brodie, the pioneer of American nuclear strategy, wrote in 1948: "the fact remains that the atomic bomb is today our <u>only</u> means for throwing substantial power immediately against the Soviet Union in the event of flagrant Soviet aggression."[69] Two years earlier, Brodie had observed that "war is unthinkable, but not impossible, and therefore we must

think about it."[70] That sentiment pretty much reflects the essence of over forty years of strategic nuclear thought in the United States from then to now. In his early writings, Brodie observed that superiority in the number of Air Forces or in the number of atomic bombs "is not itself a guarantee of strategic superiority in atomic bomb warfare."[71] By this he meant that above a minimum sufficient number of weapons the possession of additional nuclear weapons did not confer a distinct advantage. Brodie also contended that deterring war is "the only rational military policy for a country in the nuclear age."[72] From these two points Brodie determined that the most important step for the United States was to ensure that it maintained a retaliatory capability to devastate any adversary which struck the United States first.[73]

The advent of the atomic bomb and the ability to deliver it across continents significantly impacted on the nature of modern warfare. "The nature of war had changed and so had the conditions of peace."[74] The rest of this section will address the evolution of American strategy to deal with this changed nature of warfare and peace. The evolution of the Triad was and still is inexonerably linked with the evolution of that strategy.

In early 1950, an interdepartmental staff team headed by Paul Nitze, director of the State Department's Policy Planning Office, produced the first comprehensive statement of a national strategy for the Cold War, a document labeled NSC-68.[75] NSC-68 estimated that the Soviets by 1954 could make an atomic strike on the United States, that the Strategic Air Command (SAC) might be deterred from

attacking the Soviet Union, and that the Soviets might be more able to destroy SAC on the ground with a surprise attack.[76] NSC-68 "fully endorsed the [qualitative and quantitative] efforts of nuclear expansion already in progress [and] also strongly urged a rapid and mobile conventional rearmament... ."[77] NSC-68 in essence recognized that nuclear weapons were critical to the survival of the west in general and the United States in particular. By affirming the belief that the Soviets constituted a monolithic threat determined to develop a nuclear capability to threaten the United States, NSC-68 represented a watershed in the evolution of American nuclear strategy. The ability to attack an enemy, i.e. Soviet, target with nuclear weapons was one side of the coin. The ability to withstand and then retaliate against an enemy's nuclear attack on American targets was the other.

Concern about the Soviet threat and frustration with the protracted war experience in Korea led President Dwight D. Eisenhower's administration to announce publicly, in early 1954, the existence of a new policy which quickly became known as "Massive Retaliation."

> The United States would no longer constrain itself to meet Communist military probes with local conventional counterforce, as it had in Korea. Instead, it would depend primarily upon a great capacity to retaliate instantly and **massively** against the major Communist powers responsible. [emphasis added][78]

Eisenhower's massive retaliation strategy resulted from the convergence of several factors. It provided an alternative to maintaining large numbers of forces along the periphery of the

Communist world and a way to deter further Korean style aggression. Furthermore, by comparison, nuclear weapons seemed very efficient and provided more "bang for the buck" than conventional forces.[79] The final factor involved technology, which by 1953 was providing plentiful quantities of nuclear bombs with a variety of yield options available. And, of course, by that time the Strategic Air Command was well on its way to reaching its zenith as an intercontinental bomber force. Ironically, the massive retaliation strategy announced with much fanfare was not really new, [it] merely codified the military policy that the...Joint Chiefs...had already formulated in the late Truman Administration."[80]

As the 1950's unfolded, the strategy of massive retaliation came under increasing criticism. When the Soviet nuclear arsenal and delivery capabilities increased, the relative American nuclear superiority emboldened in the very nature of the massive retaliation strategy was undermined. Two papers published in late 1954 challenged the validity of massive retaliation. These papers, "The Requirements of Deterrence" by Professor William Kaufmann of Princeton and "Unlimited Weapons and Limited War" by Bernard Brodie contended that a policy of massive retaliation actually encouraged the Soviets to engage in piecemeal aggression:

> As long as each side has enough nuclear weapons to destroy the other, the threat of massive retaliation to a small-scale conventional war lacks credibility. Thus, the side with overwhelming conventional forces can go about making incursions and disrupting stability as it pleases...[81]

In response to such intellectual attacks on its fundamental defense strategy, the Eisenhower administration in the late 1950's supplemented massive retaliation with a doctrine of "graduated deterrence." Graduated deterrence basically meant that small scale Soviet incursions across the containment line would be met first by the use of tactical rather than strategic nuclear weapons.[82] For cost effectiveness reasons Eisenhower was still relying on nuclear weapons rather than large conventional forces. Massive retaliation provided the President with only two options in the event of Soviet aggression: do nothing, or launch a massive attack against the Soviet Union.[83] The President clearly needed a wider range of options.

In 1961 the administration of John F. Kennedy took office. That administration rejected the Eisenhower massive retaliation strategy in favor of a policy of "flexible response."[84] Flexible response has basically been the United States policy since that time. The intent of the new doctrine was and still is to give the President "multiple options" with which to deal with a military crisis. This meant that a sufficiency of nuclear capabilities, both strategic and tactical, would be maintained for engagement in local theaters or in a strategic nuclear exchange with the Soviet Union. However, a major, if not the primary, function of these forces would be simply to deter the adversary's use of his own nuclear forces against the United States.[85]

Under flexible response conventional forces would be upgraded and expanded to fight those conflicts, such as Korea, which could

not be prevented by nuclear deterrence. Flexible response over the past thirty years has given the President a variety of options and capabilities to employ in the face of a Soviet attack:

- Respond with conventional forces against a conventional attack
- Respond with non-strategic nuclear weapons
- Respond with limited strategic nuclear weapons delivered by the Triad
- Respond with massive strategic nuclear weapons delivered by the Triad[86]

While flexible response has remained the overall United States strategy, there have been numerous adjustments or modifications since its inception. These changes affect the Triad directly. Since the early 1960's, when the strategy was adopted, the quantity and quality of the submarine launched ballistic missile force have greatly improved. While the accuracy and targeting capabilities of the land based ICBM force have also improved, that force has become increasingly vulnerable to a Soviet first strike as have the strategic bomber bases. The number of bombers in service decreased from a high of about 2000 in the early 1960's to less than 350 in 1991.

ANALYSIS

All American Presidents since the early 1960's have dealt with the issues of deterring and planning how to fight a nuclear conflict. Considerable intellectual and strategy-making energy has been expended to (1) deter a nuclear war and (2) to terminate it on

favorable conditions quickly if it occurs. A number of significant issues have permeated this subject over the years. Four issues standout.

The first is survivability of the strategic nuclear force. That concern, more than any other, gets to the heart of the Triad program, which evolved from the combined weapons procurement decisions of the Eisenhower and Kennedy administrations. Secondly, the issue of targeting has received considerable attention. Whether to target military installations or cities has been studied extensively. The answer logically depends upon the scenario. For example, if the Soviets attack our cities, we'll probably attack theirs. If they attack our nuclear forces, we'll attack theirs. If both sides plan to attack the other's cities, then we have what has been called mutually assured destruction (MAD). If we seek to destroy each other's nuclear capabilities that is defined as a counter-force option.

A third issue involves the environmental and economic impacts of a significant exchange of nuclear weapons against the industrialized and developed world. The possibilities are alarming. No one really knows what would happen. Once again, the scenario must be defined in terms of numbers of detonations, yields, climate, geography, demographics, etc. The "surgical strike" aspect of taking out a bomber base or missile silo complex is probably more illusory than real.

The final issue, one which unlike many nuclear strategy issues cannot be easily simulated in a computer, is the moral question.

Wars throughout the ages have killed people. However, the advent of the nuclear weapon and its deployment by the thousands, as has occurred in the past forty-five years, presents the potential for the probable elimination of modern civilization. That sobering consideration played a major strategy role in the now ended Cold War confrontation. Avoiding nuclear war has perhaps been the real strategy of the Cold War for both sides. However, its success was never guaranteed. Providence has spared mankind from the fate of a nuclear holocaust. However, as the old saying goes: "The Lord helps those who help themselves."

"The nuclear strategists had come to impose order, but in the end chaos still prevailed," writes Fred Kaplan.[37] Perhaps Kaplan is too pessimistic. By confronting the realities of nuclear warfare, those strategists and the strategies they helped to define served us well. So far, no nuclear war has occurred; the concept of deterrence, which was the foundation for both massive retaliation and flexible response succeeded. Deterrence was the **end**. The massive retaliation and flexible response doctrines were the **ways** and the Triad constituted the **means**.

Threat

The preceding discussions described the Triad, reviewed its evolution, and addressed the evolution of strategy for the employment of nuclear forces. The Triad evolved directly as a response to the perceived Soviet threat which emerged after World War II. That perceived threat led to the development of the 1960 Single Integrated Operation Plan (SIOP) which targeted American

nuclear weapons against the Soviet Union, the People's Republic of China and targets in the Warsaw Pact countries of Eastern Europe.[88] The decision to select targets in China reflected the belief at that time in a monolithic Sino-Soviet Communist threat.

In July of 1991, the United States Defense Department announced that it had reduced its target list from about 10,000 to approximately 7,000 targets by exempting Eastern Europe from U.S. nuclear attack plans. The new target list plan would still, if executed, devastate the Republic of Russia under the most drastic retaliatory option that a president could approve. When announcing the new target list plan,

> senior military officials said they do not expect even to see the nuclear war plans used [and that] the plans owe their continuing existence to the theory of deterrence that has dominated U.S. and Soviet military policy for the past forty years.[89]

In further recognition of the decrease in tensions between the Soviet Union, President George Bush announced on 27 September 1991 that he was removing 40 B-52 and B-1B bombers and 450 Minuteman missiles from alert status in addition to 1600 Poseidon C3 submarine missiles. His announcement meant that for the first time since 1957 there are no U.S. strategic bombers on alert.[90] On 26 December 1991, the Soviet Union formally dissolved leaving in its wake a commonwealth of eleven independent republics in addition to three independent Baltic states and a separate Georgia.

America's Cold War opponent no longer exists as an international political entity, although the Republic of Russia assumed the Soviet Union's seat in the United Nations. However,

the former Soviet Union's arsenal of strategic and tactical nuclear weapons still exists. Although those weapons may no longer be in the hands of a hostile government, they still must be considered as potential threats. Most of the strategic nuclear weapons not on submarines are now controlled by four of the Soviet Union's former republics as indicated below:[9]

Location	ICBM	Heavy Bombers	Total Warheads
Ukraine	176	30	4,356
Byelorussia	72	0	1,222
Kazakhstan	104	0	1,690
Russia	1,035	70	17,505

These strategic nuclear weapons plus the former Soviet SLBM systems now under the nominal control of the Russian Republic must be considered in assessing security needs of the United States. Virtually all of the available unclassified literature and analyses pertaining to the Soviet strategic threat do not yet incorporate the reality that the Soviet Union no longer exists. Most available analysis assumes that a state of competition still exists between the former Soviet Union and the United States. In time, the analysts and the commentators will catch up to the reality that we no longer must think in terms of "us versus them." The demise of the Soviet Union, though expected, seems to have surprised many of us. In that context the United States will have to rethink its deterrence strategy and its Triad vis a vis the Soviet Union.

When defining a threat the intelligence analyst or policy maker considers three basic issues: capabilities, intentions, and will. In the not too distant past the Soviet Union was perceived as having an intent to spread its political system by intimidation

or force. It also had the military capabilities to do so and in some situations the will to do so as demonstrated in Hungary in 1956, Czechoslovakia in 1968, and Afghanistan in 1979. However, the Soviets avoided a direct military confrontation with the United States in pretty much the same manner that the United States sought to avoid a direct involvement with them.

Now the Soviet Union does not exist. Some of the newly independent republics still have nuclear capabilities, but their operational integration is significantly less than it was when the Soviet Union was at its prime. More importantly, those republics most likely have neither the intent nor the will to confront the United States. To the contrary, they appear to want and to need American economic and technical involvement. As a precondition for such American assistance, the United States should require that the nuclear weapons, particularly the ICBMs, held by the independent republics, be dismantled. As long as those weapons exist, the United States cannot standdown its ICBM leg of the Triad.

Of greater security concern is the disposition of smaller and less complicated Soviet tactical nuclear weapons which might wind up in the arsenal of a Libya, Iraq, North Korea, or other international maverick. Although there is understandable concern in the United States and elsewhere about the proliferations of nuclear technology and weapons, that concern generally relates to regional stabilities, rather than the survival of the United States. For these reasons, the potential proliferation of nuclear weapons, while important, does not constitute a direct threat in

the foreseeable future that requires all elements of the Triad for deterrence or warfighting. Should a meaningful nuclear threat began to emerge, the United States, in conjunction with other nations or acting alone, would have the capability to disrupt any third world nation's effort to acquire or employ nuclear weapons. Such disruption could involve political, military, diplomatic, and economic means. A military response to a regional nuclear threat would not necessarily require an American nuclear response.

Alternatives to Retaining the ICBM Capability

The United States may decide to eliminate its ICBM capabilities due to budget reductions, arms control initiatives, or because it decides that ICBMs are simply no longer needed. If this condition develops, then the United States will probably retain a Dyad of bombers and submarines. Depending upon the projected threat environment, the quantitative loss of strategic nuclear capability resulting from eliminating the ICBM leg might not need to be offset. Eliminating the ICBM force would also eliminate the need for a future adversary to attack the missile silos based in the United States. While this might free enemy weapons to be employed elsewhere, it would probably mean that fewer nuclear weapons would be fired at the continental United States. In addition to the Dyad, theater nuclear weapons could be employed in lieu of ICBM delivered warheads if necessary. As the fleet of strategic bombers is reduced due to obsolescence and budget reductions, that leg of the Triad may not be able to compensate for the decrease in ICBM delivery systems unless

additional bombers are acquired. A future deficit in strategic launch capabilities could be redressed by deploying additional higher cost SLBM systems should a change in the nuclear threat environment warrant the increase.

Advantages/Disadvantages of Each Leg of the Triad

In the development of this monograph many characteristics of each Triad component have been addressed. The Triad provides a good example of a situation where the total is greater than the sum of its parts. That cumulative value also contributes an indirect value for each of the legs that should be considered. Historically there have been five rationales for retaining ICBMs: accuracy, lower costs, better command and control communications (C^3), nuclear security and the so-called sovereignty issue.[92]

Although the cost of weapon systems has always been a critical issue, accuracy was more important. While ICBMs were historically more accurate than missiles launched from submarines, that situation began to change in the mid 1980's. The Trident D5 missile is expected to have virtually the same accuracy as the MX Peacekeeper ICBM and will be considerably more accurate than the Minuteman III missile with its MK12A warhead package.[93]

In the C^3 area the ICBM is still probably slightly ahead of the SLBM leg of the Triad, however, the ICBM with its better C^3 system is more vulnerable to being damaged or destroyed in its silo, while the submarine launcher platform operates in relative security under the seas.

The life cycle cost of ICBMs installed in fixed underground silos is considerably less than that of submarine installed missiles. However, the vulnerability of those missiles in their silos to first strike attack by an enemy tends to mitigate their cost advantage. Should the United States elect to replace its fixed silo ICBM force with mobile ICBM systems, the cost advantage would then be significantly less for the ICBM leg of the Triad because mobile missiles are more costly than fixed silo missiles.[94] The two remaining justifying rationales involve the fact that ICBMs are deployed on United States soil and that it is easier to physically secure or control the nuclear devices. By being on U.S. soil, an attack on them is without question an attack on the United States. That consideration would require a rational potential aggressor to decide to cross an irrevocable threshold before initiating an attack against the United States.

The preceding discussion can also be applied to the manned bomber leg of the Triad. Bombers require crews, maintenance, regular flying, crew training, and air bases: all of which cost money. The life cycle costs of bombers is more costly than ICBMs. That is one of the major reasons Secretary of Defense Robert S. McNamara retired the B-47 fleet in the 1960's in favor of deploying 1,000 Minuteman ICBMs.[95]

He was influenced in making his decision by Albert Wohlstetter, a RAND Corporation analyst, who concluded "that the U.S. bomber force was unnecessarily vulnerable to a Soviet attack."[96] The technology required to build a modern survivable

bomber, such as the B2 Bomber, is extraordinarily expensive. Bombers can deliver nuclear weapons accurately and they generally have reliable C^3 systems. An important feature of the manned strategic bomber is that it can be deployed to convey resolve and still be called back without entering the airspace of a potential adversary. Bombers can engage multiple targets using gravity bombs or air launched cruise missiles. This enhances their combat utility. Bombers, however, are vulnerable to being destroyed at their air bases if caught on the ground by surprise. Bombers are also vulnerable to enemy air defenses, both surface to air missiles and air defense aircraft. As was demonstrated in the Gulf War in 1991, strategic bombers can also be configured to deliver conventional bombs. Their dual capability enhances the bomber's cost effectiveness.

In assessing the advantages and disadvantages of each leg of the Triad, one must consider the scenario or scenarios in which that component might be employed. The Triad, which evolved from the strategic weapons programs initiated in the Eisenhower and Kennedy administrations, was specifically developed to counter a major Soviet threat which was believed to threaten the very survivability of the United States itself. We can now question the need for the Triad's continued existence, assuming a series of benign independent republics friendly to the west emerge from the political rubble of the Soviet empire. Therefore, issues of survivabilility, accuracy, and C^3 take on different meanings in the context of a post Cold War world where the survivability of the

United States is no longer threatened. Nevertheless it is still pertinent to consider several observations about the advantages and disadvantages of the separate components of the Triad assuming that the United States is still facing a Soviet style strategic nuclear threat. This is necessary because "the balance of U.S.-U.S.S.R. strategic power, whether. . . measured in yield, accuracy, or throw-weight, heavily favors the [former] Soviet Union."[97] The entire Soviet strategic arsenal includes at least 44 percent more yield than the U.S. arsenal.[98] This has traditionally posed more of a psychological disadvantage for the United States rather than military disadvantage.

ICBMs are the most important warfighting leg of the U.S. Triad for several reasons indicated below according to one assessment.[99]

War Fighting Qualities Compared:
ICBMs Superior to SLBMs and Bombers

Characteristic	ICBMs	SLBMs	Bombers
Command-control-communications	Best	Worst	Medium
Readiness	Best	Medium	Worst
Payload	Medium	Worst	Best
Retargetability	Best	Worst	Medium
Range	Best	Medium	Worst
Penetration	Best	Medium	Worst
Collateral damage	Best	Medium	Worst
Survivability	Medium	Best	Worst
Sustainability	Best	Medium	Worst
Total of Best Qualities	8	1	1

While the author of the above chart assigns a "medium" score to ICBM survivability that assessment may be overly optimistic in a scenario where an enemy launches a "bolt from the blue" surprise attack on the U.S. ICBM bases. Missiles deployed in fixed silos, which are exceptionally vulnerable to an initial knock out, do not satisfy the requirement for survivability. That requirement is better filled by SLBMs at sea. By focusing on the warfighting role of ICBM's, the author suggests that a weapon system optimized for warfighting is also the best for the deterrence role. However, if that system, i.e. the ICBM force, is not survivable, one can question both its deterrence and warfighting value. In general I offer the following observations about the Triad:

- The ICBM force is the most cost-effective deterrence force.
- The ICBM force is the most vulnerable wartime force since it is situated at known locations and can't displace to avoid attack.
- The SLBM force is perceived to be the most survivable force when at sea.
- The SLBM force is probably the most expensive force overall.
- The SLBM force is evolving into a system equally as accurate and lethal as is the ICBM force.
- The strategic bomber force is more expensive to own then is the ICBM force.
- The strategic bomber force is subject to destruction on the ground or in the air.
- The strategic bomber force can be deployed to demonstrate resolve and can be recalled before entering an adversary's airspace.

- The strategic bomber force can deliver conventional bombs when configured to do so.

Impact of the START on the ICBM Leg of the Triad

The Strategic Arms Limitation Talks, which began in 1969, reflected the arms control focus of U.S. and Soviet relations for the next twenty years. On 31 July, 1991, the President of the Soviet Union and the United States signed the Strategic Arms Reduction Treaty (START). This treaty is the first treaty to eliminate long range nuclear weapons; earlier agreements limited growth, but did not cut back on existing systems.

Under START, the United States will eliminate 1,000 warheads from its ICBM force and 1,600 warheads from its SLBM force. Overall the Soviets are required to eliminate 2,000 warheads more than will the United States. Ironically, after START, the United States and the Soviet Union are essentially allowed the number of warheads on-hand when the START talks began nine years earlier.[100] When President Bush took the missiles and bombers off alert status in September of 1991, he was simply advancing the START timetable by standing down those weapons which will be retired from service anyway. Although seen by many as an important step in nuclear arms control, one analyst concludes that under the provisions of START, the United States would be unable to retaliate against most Soviet strategic targets.[101] However, that analysis was completed before the Soviet Union disintegrated as a political entity and an ideological adversary of the United States.

CONCLUSION AND IMPLICATIONS

When I began researching this project in the late Spring of 1991, I was fascinated with the subject of nuclear weapons and strategy. As I conducted my research the environmental dynamics surrounding the subject changed drastically. Although Soviet nuclear weapons and delivery systems remain, the Soviet Union as a political entity does not. In all the years of strategizing and thinking about deterrence and, should it fail, nuclear warfighting, most scholars perhaps did not fully comprehend that it takes more than a nuclear arsenal to survive as a true superpower.

The preceding discussion is quite important to determining if the United States should retain its ICBM force. That force and the other two legs of the Triad were envisioned and created to protect America from intimidation or attack by the Soviet Union. Now the Soviet Union no longer exists. At some time in the not too distant future, the United States will be able to retire most of its ICBM force. Now, however, is not the time to take such a bold step. First, the United States must negotiate with each of the newly independent former Soviet republics to arrange for a significant reduction or total elimination of their ICBMs, strategic bombers, and SLBM assets. Although these fledgling "new" republics should have no particular desire to employ those weapons against the United States or its allies, there is always the possibility, remote as it may seem, that one or more of those republics may be susceptible to take over by reactionary forces. If that were to occur, those forces might reverse some of the recent democratic

developments and pose a threat to stability and western interests. The possibility of inter-republic conflicts where nuclear weapons are used is also worth consideration. And finally the spread of Soviet missile and nuclear technology to certain third world regional powers or powers to be must be prevented. If the spread of nuclear technology is not prevented, then the United States might at some future date face a nuclear armed regional threat.

The Triad has served the United States well in its three decades of existence. If the recent favorable developments in the world situation continue, the time will soon come to substantially reduce the Triad. At that time it will be appropriate to retire most of the ICBM force and perhaps reduce the other two legs of the Triad.

Ironically, the MIRV'd intercontinental ballistic missile, could be operationally inappropriate in a future conflict with one of the former Soviet republics. Its minimum warhead dispersion pattern or "footprint" would cause warheads to fall in territory belonging to a non-belligerent neighboring republic. Nuclear weapon systems designed for the Cold War target environment may not be suitable for a future conflict where there are fewer targets.

The threat issue clearly stands as the dominant consideration when determining whether or not the United States should retain its ICBM force as well as the nature and composition of the strategic Triad. Efforts should be initiated soon to encourage those former Soviet republics possessing first-strike ICBM assets to demilitarize those missiles. A greatly reduced Soviet strategic

nuclear threat can eventually be reflected in a greatly reduced the United States ICBM force.

END NOTES

1. Dick Cheney, Joint Military Assessment 1991, Washington, 1991, p. 6-1.

2. Frank C. Carlucci, Annual Report to the Congress (FY1990), Washington, 1989, pp. 36-37.

3. James Worsham, "Bombers, Missiles Now Off Long Alert," The Kansas City Star, 29 September 1991, pp. 1 and 8.

4. "U.S. Ready to Welcome New Russia," The Kansas City Star (from the New York Times), 24 December 1991, p. 1.

5. Captain James R. Lynch (USN), "Triad or Dyad," Proceedings, January, 1990, p. 61.

6. Dick Cheney, Annual Report to the President and Congress, Washington, 1991, pp. 30-32.

7. Ibid., p. 75.

8. Dick Cheney, Joint Military Assessment, Washington, 1991, p. 6-1.

9. Dick Cheney, Annual Report to the President and Congress, Washington, 1991, p. 75.

10. Norman Polman and Timothy Laur, ed., Strategic Air Command-People, Aircraft, and Missiles, Baltimore, 1990, p. 251. On 17 January 1992, while visiting SAC Headquarters, I learned that all FB-111 bombers have now been assigned to the Tactical Air Command for use in "theater missions."

11. William Matthews, "Fallout from Cuts Spans Range of Opinion," Army Times, 14 October 1991, p. 6.

12. Marty Baumann, "How the Arsenals Grew," USA Today, 1 August 1991, p. 4A.

13. Ibid.

14. Frank C. Carlucci, Annual Report to Congress (FY1990), Washington, 1989, p. 37.

15. Dick Cheney, Annual Report to the President and Congress, Washington, 1991, p. 31.

16. Andy Pasztor, "Strategic Air Command to be Eliminated in Sweeping Reorganization of Air Force," Wall Street Journal, 22 September 1991, p. 3.

17. Robert C. Aldridge, First Strike-The Pentagon's Strategy for Nuclear War, Boston, Massachusetts, 1983, p. 27.

18. Peter Pringle and William Arkin, S.I.O.P.-The Secret U.S. Plan for War, New York, 1983, pp. 110-111.

19. Ibid., p. 112.

20. Dick Cheney, Soviet Military Power, Washington, 1990, p. 64.

21. Ibid., p. 66.

22. Frank C. Carlucci, Annual Report to Congress (FY1990), Washington, 1989, p. 181.

23. Ibid.

24. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 221.

25. Ibid., p. 214.

26. Ibid., p. 216.

27. Ibid.

28. Ibid., p. 223.

29. Norman Polmar and Timothy Laur, ed., Strategic Air Command-People, Aircraft, and Missiles, Baltimore, 1990, p. 234.

30. Ibid.

31. Ibid., p. 254.

32. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 480.

33. G. Harry Stine, ICBM-The Making of the Weapon that Changed the World, New York, 1991, p. 109.

34. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 478.

35. Ibid., p. 480.

36. Ibid., p. 482.

37. Ibid., p. 483.

38. G. Harry Stine, ICBM-The Making of the Weapon that Changed the World, New York, 1991, p. 106.

39. The Post World War II development of the Soviet Union's ICBM program using captured German scientists, engineers, and technicians is described in Chapters 21-23 of ICBM-The Making of the Weapon that Changed the World. The author's thesis is essentially that Stalin recognized the military value of rockets and missiles and acted on that recognition by establishing and supporting an aggressive program starting with considerable less than the United States. He contends, for example, that the Soviets, unlike the Americans, had no actual V-2 rockets with which to work.

40. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 448.

41. Ibid., p. 489.

42. Ibid., p. 490.

43. Ibid., p. 491.

44. Ibid., p. 493.

45. Ibid.

46. Norman Polmar and Timothy Laur, ed., Strategic Air Command-People, Aircraft, and Missiles, Baltimore, 1990, p. 229.

47. Ibid., p. 302-303 and 318-319.

48. G. Harry Stine, ICBM-The Making of the Weapon that Changed the World, New York, 1991, p. 220.

49. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 499.

50. Norman Polmar and Timothy Laur, ed., Strategic Air Command-People, Aircraft, and Missiles, Baltimore, 1990, p. 320.

51. Frank C. Carlucci, Annual Report to the Congress (FY1990), Washington, 1989, p. 231.

52. G. Harry Stine, ICBM-The Making of the Weapon that

Changed the World, New York, 1991, p. 230.

53. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 499.

54. G. Harry Stine, ICBM-The Making of the Weapon that Changed the World, New York, 1991, p. 240.

55. Soviet Military Power 1990, Washington, 1990, p. 64.

56. Robert F. Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, Volume I (1907-1960), Maxwell Air Force Base, Alabama, 1989, p. 504.

57. G. Harry Stine, ICBM-The Making of the Weapon that Changed the World, New York, 1991, p. 204.

58. Ibid., p. 211.

59. Jerome H. Kaplan, Security in the Nuclear Age, Washington, 1975, p. 37.

60. Ibid., p. 39.

61. Ibid., p. 47.

62. Ibid., p. 62.

63. Peter V. Pry, The Strategic Nuclear Balance, New York, 1990, p. 73.

64. Teena Karsa Mayers, Understanding Weapons and Arms Control, New York, 1991, p. 77.

65. Dick Cheney, Annual Report to the President and Congress, Washington, 1991, p. 32.

66. Teena Karsa Mayers, Understanding Weapons and Arms Control, New York 1991, p. 77.

67. Frank C. Carlucci, Annual Report to the Congress (FY1990), Washington, 1989, p. 188.

68. Mark Perry, Four Stars, Boston, 1989, p. 15.

69. Fred Kaplan, The Wizards of Armageddon, Standford, California, 1991, p. 33.

70. Ibid., p. 34.

71. Ibid., p. 30.

72. Ibid., p. 31.

73. Ibid.

74. Ibid., p. 32.

75. Alexander L. George and Richard Smoke, Deterrence in American Foreign Policy, New York, 1974, p. 26.

76. Ibid., p. 28.

77. McGeorge Bundy, Danger and Survival, New York, 1988, p. 230.

78. Alexander L. George and Richard Smoke, Deterrence in American Foreign Policy, New York, 1974, p. 27.

79. Ibid., p. 28.

80. Fred Kaplan, The Wizards of Armageddon, Standford, California, 1991, p. 181.

81. Ibid., p. 192.

82. Alexander L. George and Richard Smoke, Deterrence in American Foreign Policy, New York, 1974, p. 30.

83. Frank C. Carlucci, Annual Report to the Congress (FY1990), Washington, 1989, p. 35.

84. Alexander L. George and Richard Smoke, Deterrence in American Foreign Policy, New York, 1974, p. 31.

85. Ibid.

86. Frank C. Carlucci, Annual Report to the Congress (FY1990), Washington, 1989, p. 35.

87. Fred Kaplan, The Wizards of Armageddon, Standford, California, 1991, p. 391.

88. Ibid., p. 269.

89. R.J. Smith, "U.S. Trims List of Targets in Soviet Union," The Washington Post, 21 July 1991, p. 1.

90. William Matthews, "Behind Drama, U.S. Arsenal Largely Intact," Army Times, 14 October 1991, p. 6.

91. George J. Church, "Soviet Nukes on the Loose," Time, 16 December 1991, p. 41.

92. James L. George, The New Nuclear Rules: Strategy and Arms Control after START and INF, New York, 1990, p. 143.

93. Ibid.

94. Ibid.

95. Norman Polmar and Timothy Laur, ed., Strategic Air Command-People, Aircraft, and Missiles, Baltimore, 1990, p. 200.

96. Peter V. Pry, The Strategic Nuclear Balance (Vol I), New York, 1990, p. 173.

97. Ibid.

98. Ibid., p. 122.

99. William Matthews, "Nuclear Warhead Cuts Outlined," Army Times, 12 August 1991, p. 27.

100. Stephen J. Cimbala, Nuclear War and Nuclear Strategy, New York, 1987, p. 3.

101. Peter V. Pry, The Strategic Nuclear Balance (Vol 2), New York, 1990, p. 301.

BIBLIOGRAPHY

Books

Abshire, David M., et. al., eds. Securing Strategic Stability. Washington: Center in Strategic and International Studies, 1988.

Aldridge, Robert C., First Strike - The Pentagon's Strategy for Nuclear War. Boston: South End Press, 1983.

Blechman, Barry M., ed., Technology and the Limitation of International Conflict. Washington: Johns Hopkins, 1989.

Blight, James G., The Shattered Crystal Ball. Savage, Maryland: Rowman and Littlefield, 1990.

Bobbitt, Philip,,l et. al., eds. US Nuclear Strategy. Washington Square, New York: New York University Press, 1989.

Branch, Christopher I., Fighting A Long Nuclear War. Washington: National Defense University Press, 1984.

Braun, Anthony Cave., ed. Dropshot - The United States Plan for the War with the Soviet Union in 1957. New York: The Dial Press, 1978.

Brodie, Bernard. Strategy in the Missile Age. Princeton, New Jersey: Princeton University Press, 1959.

Bundy, McGeorge. Danger and Survival - Choices About the Bomb in the First Fifty Years. New York: Random House, 1988.

Carlucci, Frank C. Annual Report to the Congress (FY1990). Washington, DC: U.S. Government Printing Office, 1989.

Carter, Ashton B., et. al., eds. Managing Nuclear Operations. Washington: Brookings Institution, 1987.

Cheney, Dick. Annual Report to the President and Congress. Washington, DC: U.S. Government Printing Office, 1990.

Cheney, Dick. Annual Report to the President and Congress. Washington, DC: U.S. Government Printing Office, 1991.

Cheney, Dick. Joint Military Assessment 1991. Washington, DC: Joint Chiefs of Staff, 1991.

Cheney, Dick. Soviet Military Power 1990. Washington, DC: U.S. Government Printing Office, 1990.

Cimbala, Stephen J. and Douglass, Joseph D., Jr., eds. Ending a Nuclear War - Are the Superpowers Prepared? Washington: Pergamon - Brassey's, 1988.

Cimbala, Stephen J., First Strike Stability. New York: Greenwood Press, 1990.

Cimbala, Stephen J., Nuclear Strategizing. New York: Praeger, 1988.

Cimbala, Stephen J., Nuclear War and Nuclear Strategy. New York: Greenwood Press, 1987.

Cimbala, Stephen, J., Strategic Impasse. New York: Greenwood Press, 1989.

Cimbala, Stephen J., ed. The Soviet Challenge in the 1990s. New York: Praeger, 1989.

Chong-Pin Lin. China's Nuclear Weapons Strategy. Lexington, Massachusetts: Lexington Books, 1988.

Craig, Paul P. and Jungerman, John A. Nuclear Arms Race. New York: McGraw-Hill, 1986.

David, Charles-Philippe. Debating Counterforce - A Conventional Approach in a Nuclear Age. London: Westview Press, 1987.

Davis, Paul K., Studying First-Strike Stability With Knowledge Based Models of Human Decisionmaking. Santa Monica, California: The RAND Corporation, 1989.

Ehrlich, Robert. Waging Nuclear Peace. Albany, New York: University of New York Press, 1985.

Erikson, Viking O. Sunken Nuclear Submarines. London: Norwegian University Press, 1998.

Freedman, Lawrence. The Evolution of Nuclear Strategy. New York: St. Martin's Press, 1983.

Frisby, John E. and Myers, Grover E. Strategic Forces in Transition. Maxwell Air Force Base, Alabama: The Air University Press, 1985.

Futrell, Robert F. Ideas, Concepts, Doctrine-Basic Thinking in the United States Air Force, vols 1 and 2. Maxwell Air Force Base, Alabama: Air University Press, 1989.

George, Alexander L. and Smoke, Richard. Deterrence in American Foreign Policy. New York. Columbia University Press, 1974.

George, James L. The New Nuclear Rules: Strategy and Arms Contorl after START and INF. New York: Saint Martin's Press, 1990.

George, James L. The New Nuclear Rules - Strategy and Arms Control After INF and START. New York: St. Martin's Press, 1990.

Goldberg, Andrew C., et. al., eds. Avoiding the Brink: Theory and Practice in Crisis Management. New York: Brassey's, 1990.

Goldberg, Andrew C., ed. Securing Strategic Stability. Washington: The Center for Strategic and International Studies, 1988.

Gray, Colin S. Nuclear Strategy and National Style. London: Hamilton Press, 1986.

Gray, Colin S. Nuclear Strategy and Strategic Planning. Philadelphia: Foreign Policy Research Institute, 1984.

Green, William C. and Karasik, Theodore, eds. Gorbachev and His Generals - The Reform of Soviet Military Doctrine. San Francisco: Westview Press, 1990.

Greenwood, Ted. Making the MIRV: A Study of Defense Decisionmaking. Cambridge, Massachusetts: Ballinger Publishing Company, 1975.

Greynolds, Orville L. "Strategic Offensive Nuclear Forces of the United States: A Linear Programming Model." Ph.D. diss., The George Washington University, 1979.

Greynolds, Orville L. "Strategic Offensive Forces of the United States: A Linear Programming Model." Ph.D. diss., The George Washington University, 1981.

Hansen, Chuck. US Nuclear Weapons - The Secret History. New York: Orion Books, 1988.

Holroyd, Fred., ed. Thinking About Nuclear Weapons. Dover, Massachusetts: Auburn House Publishing Company, 1985.

Hopmann, P. Terrence, ed., Rethinking the Nuclear Weapons Dilemma in Europe. New York: St. Martin's Press, 1988.

Huisken, Ronald. The Origin of the Strategic Cruise Missile. New York: Praeger Publishers, 1981.

Jervis, Robert. The Illogic of American Nuclear Strategy. London: Cornell University Press, 1984.

Jervis, Robert. The Meaning of the Nuclear Revolution. Ithaca, New York: Cornell University Press, 1989.

Johns, Lionel S. et. al., ed. The Effects of Nuclear War. Washington: U.S. Government Printing Office, 1979.

Kahan, Jerome J. Security in the Nuclear Age. Washington: The Brookings Institution, 1975.

Kahn, Herman. On Thermonuclear War. Princeton, New Jersey: Princeton University Press, 1961.

Kaplan, Fred. The Wizards of Armageddon. New York: Simon and Schuster, 1983.

Karp, Regina C., ed. Security With Nuclear Weapons. New York: Oxford Press, 1991.

Kissinger, Henry A. Nuclear Weapons and Foreign Policy. New York: Harper Brothers, 1957.

Knight, Michael. Strategic Offensive Air Operations. London: Brassey's, 1989.

Leary, David A. Optimizing the Post-START U.S. Strategic Nuclear Force Mix, Maxwell Air Force Base, Alabama: Air University Press, 1990.

Levine, Robert A. The Strategic Nuclear Debate. Santa Monica, California: The Rand Corporation, 1987.

Martel, William C. and Savage, Paul L. Strategic Nuclear War. New York: Greenwood Press, 1986.

May, Michael M., et. al. Strategic Arms Reductions. Washington: Brookings Institution, 1988.

Mayers, Teena K. Understanding Weapons and Arms Control. Washington: Brassey's, 1991.

McInnes, Colin. NATO's Changing Strategic Agenda. Boston: Unwin Hyman, 1990.

Menos, Dennis. The Superpowers and Nuclear Arms Control. New York: Praeger, 1990.

Miller, Steven E., ed. Strategy and Nuclear Deterrence. Princeton, New Jersey: Princeton University Press, 1984.

Moulton, Harland B. From Superiority to Parity. London: Greenwood Press, 1973.

Newhouse, John. War and Peace in the Nuclear Age. New York: Alfred A. Knopf, 1989.

Osgood, Robert E. The Nuclear Dilemma in American Strategy Thought. London: Westview Press, 1988.

Perry, Mark. Four Stars. Boston, Massachusetts: Houghton Mifflin Company, 1989.

Polmar, Norman and Laur, Timothy M., eds. Strategic Air Command - People, Aircraft, and Missiles. Baltimore, Maryland: The Nautical and Aviation Publishing Co., 1990.

Powaski, Ronald E. March to Armageddon. New York: Oxford University Press, 1987.

Pringle, Peter and Arkin, William. S.I.O.P. - The Secret U.S. Plan for Nuclear War. New York: W. W. Norton, 1983.

Pry, Peter V. The Strategic Nuclear Balance (Vol 1). Washington: Crane Russak, 1990.

Pry, Peter V. The Strategic Nuclear Balance (Vol 2). Washington: Crane Russak, 1990.

Reule, Fred J. Dynamic Stability. Maxwell Air Force Base, Alabama: Air University Press, 1987.

Sagan, Scott D. Moving Targets. Princeton, NJ: Princeton University Press, 1989.

Scott, Bill. Inside the Stealth Bomber - The B2 Story. Blue Ridge Summit, Pennsylvania: Tab-Aero Books, 1991.

Seiler, George J. Strategic Nuclear Force Requirements and Issues. Maxwell Air Force Base, Alabama: Air University Press, 1983.

Speed, Roger D. Strategic Deterrance in the 1980's. Standford, California: Hoover Institution Press, 1979.

Stiner, G. Harry. ICBM - The Making of the Weapon That Changed the World. New York: Orion Books, 1991.

Tsipis, Kosta. Arsenal: Understanding Weapons in the Nuclear Age. New York: Simon and Schuster, 1983.

Vorys, Karl Von. American National Interest. New York: Praeger, 1990.

Watts, Barry D. The Foundations of U.S. Air Doctrine. Maxwell Air Force Base, Alabama: Air University Press, 1984.

Yenne, Bill. SAC. Novato, California: Presidio Press, 1985.

Articles

Baumann, Marty. "How the Arsenals Grew," USA Today, 10 August 1991, p. 4A.

Church, George J. "Soviet Nukes on the Loose," Time, 16 December 1991, pp. 38-41.

Lynch, James R., Captain, USN. "Triad or Dyad?", Proceedings, January 1990, pp. 61-65.

Matthews, William. "Behind Drama, U.S. Arsenal Largely Intact," Army Times, 14 October, 1991, p. 6.

Matthews, William. "Fallout from Cuts Spans Range of Opinion," Army Times, 14 October 1991, p. 6.

Matthews, William. "Nuclear Warhead Cuts Outlined," Army Times, 12 August 1991, p. 27.

Pasztor, Andy. "Strategic Air Command to be Eliminated in Sweeping Reorganization of Air Force," Wall Street Journal, 22 September 1991, p. 3.

Smith, R.J. "U.S. Trims List of Targets in Soviet Union," The Washington Post, 21 July 1991, p. 1.

"U.S. Ready to Welcome New Russia." The Kansas City Star (from the New York Times), 24 December 1991.

Worsham, James. "Bombers, Missiles New Off Long Alert." The Kansas City Star, 29 September 1991.