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FIGHTING A LONG NUCLEAR WAR

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FIGHTING A LONG NUCLEAR WAR

A Strategy, Force, Policy Mismatch

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FIGHTING A LONG NUCLEAR WAR

A Strategy, Force, Policy Mismatch

Colonel Christopher I. Branch, USAF
Senior Fellow

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FOREWORD

For many years, US nuclear strategy was based on the idea of a single, massive retaliation in a short war. In recent years, especially during the last two administrations, our strategy has evolved into one premised upon multiple nuclear exchanges in a longer war. This study poses a fundamental question: Have US nuclear forces and implementing policies kept pace with declared strategy?

Colonel Christopher I. Branch, US Air Force, argues that disturbing distances have opened between US nuclear strategy and the forces and policies which back that strategy. He develops a framework for examining the complexities of nuclear warfighting, then examines weapons, support systems, command and control, and employment plans. Calling for policymakers to do more than just tout the virtues of a "flexible" strategy, Colonel Branch advises that costly new forces and greatly restructured plans may be needed. At stake, he cautions, may be the credibility of deterrence itself.

The National Defense University is pleased to publish this consideration of our nation's nuclear strategy and nuclear capability.



Richard D. Lawrence
Lieutenant General, US Army
President, National Defense
University

ABOUT THE AUTHOR

Colonel Christopher I. Branch, US Air Force, is a graduate of Stanford University, where he received B.S. and M.S. degrees in industrial engineering. A distinguished graduate of Officer Training School, graduating first in his class, Colonel Branch has also completed Squadron Officer School, the Armed Forces Staff College, the Industrial College of the Armed Forces, the Air War College, and the National War College. Colonel Branch has held Atlas F, Minuteman II and III, and Peacekeeper and other assignments at Dyess, Ellsworth, Minot, and Grand Forks Air Force Bases, Strategic Air Command, and Headquarters, Air Force. Currently, Colonel Branch is the Vice Commander, 90th Strategic Missile Wing, Francis E. Warren Air Force Base.

1. ORIGINS OF A STRATEGIC DILEMMA

Recent events have profoundly altered this Nation's approach to nuclear warfare. With the signing of Presidential Directive (PD) 59 on 25 July 1980, President Carter directed US nuclear forces to achieve new levels of flexibility, including "counterforce" capability (the ability to attack hardened targets), together with the ability to survive and operate over a protracted period.¹ Soon after inauguration, President Reagan's administration restated the purpose and mission of US nuclear forces and reinforced thoughts on long war by calling attention to the requirement that a significant part of our strategic forces should be capable of enduring survival, even in the cataclysmic event of a protracted nuclear war.² Taken collectively, these new statements about how US nuclear forces are to be used seem to represent a shift in the strategy for employment of nuclear weapons. Unfortunately, our understanding of how to implement policy has not kept pace with these changes.

The basic objective of strategic forces remains deterrence. In the past, deterrence was enforced by threatening a retaliatory strike via the Single Integrated Operational Plan (SIOP). Deterrence would be implemented through various stratagems of retaliation, which gradually evolved from "massive retaliation" through "assured destruction" to "countervailing strategy." Because the doctrine of a single large retaliatory blow did not demand detailed planning for follow-on nuclear strikes, strategic planners have not invested a great deal of effort in preparing for the prosecution of a long war. For similar reasons, today's strategic nuclear forces reflect

past emphasis on the philosophy of a single-strike retaliation, and here the dilemma arises. Our US nuclear forces and their employment policies have evolved to support primarily a short-war strategy. Now, nuclear forces and policies must also credibly reflect a long-war strategy. If current forces and policies are not up to the task—and I contend they are not—this nation is faced with a serious mismatch among strategy, forces, and implementing policy.

EVOLUTION OF RECENT STRATEGIC POLICY

To appreciate where we are, it is useful to examine where we have been. A review of US nuclear policy over the last decade provides helpful insights into the present dilemma. Specifically, this review will help further our understanding of the wellsprings of current statements on nuclear policy, culminating in PD-59.

The Past Decade of US Policy for Nuclear War

Although the directive has been described by Secretary of Defense Harold Brown as codifying the "countervailing strategy,"³ the genesis of PD-59 can be traced to 1970 statements by President Nixon. President Nixon decried the lack of flexibility in existing strategic policy:

Should a President in the event of a nuclear attack be left with the single option of ordering the mass destruction of enemy civilians in the face of the certainty that it would be followed by the mass slaughter of Americans?⁴

His concern led to National Security Study Memorandum 169, which directed the development of a coherent and comprehensive nuclear policy. He signed the resulting policy document, National Security Decision Memorandum (NSDM) 242, on 17 January 1974. It represents a Presidential statement of nuclear employment policy still reflected by PD-59, which superseded it and reaffirmed and extended many of its policies. The principal policy components of NSDM-242 were (a) re-emphasis on targeting a wide range of Soviet forces and in-

stallations; (b) a requirement for "escalation control" whereby the National Command Authority (NCA) held the ability to execute selected options in a deliberate and controlled manner; and (c) the designation of "withholds," targets not to be attacked.⁵

Shortly after taking office, President Carter directed a review of nuclear strategy as a part of his Presidential Review Memorandum 10. This initial review, completed by the issuance of Presidential Directive 18 in August 1977, reaffirmed the basic nuclear policies set forth in NSDM-242 but called for a study to reevaluate employment policy.⁶ The ensuing study effort became known as the Nuclear Targeting Policy Review and served as the basis for PD-59.⁷

Implications of PD-59

Presidential Directive 59 is an evolutionary rather than a revolutionary document, as Harold Brown carefully pointed out in his Newport speech of 20 August 1980.⁸ The directive emphasizes the concept of warfighting as a basis for deterrence. It also stresses the need to employ strategic nuclear forces more "selectively," that is, at a range of levels lower than all-out retaliation, and against selected targets such as military forces or industry.⁹ Although reviewed and modified somewhat under the Reagan administration, the essentials of PD-59 remain intact.

As an implementing directive for employment of nuclear weapons in support of newly restated doctrine, PD-59 implies several important things. In order to achieve specified flexibility of effect, weapons must be precisely accurate. Emphasis on targeting military forces requires not only high accuracy but precise warhead yields, either large enough to inflict damage to hardened structures or small enough to limit destruction to nearby areas. Selectivity in force levels also requires excellent command, control, and communications (C³ in the Department of Defense lexicon) and tight "connectivity" (control links) with the NCA.

In essence, PD-59 upgrades even further the flexibility and controllability of nuclear munitions.

The Impact of Reagan Administration Pronouncements

Secretary of Defense Caspar Weinberger's statements have offered clear evidence of new directions for the US approach to nuclear war. In his speech to the Council on Foreign Relations on 17 June 1981, Secretary Weinberger detailed the administration's defense policy. For nuclear forces, the Reagan defense policy requires weapon systems "capable of enduring survival, even in the cataclysmic event of a protracted nuclear war."¹⁰ This statement acknowledges the concept of a *long war*, a concept which has profound implications for strategic nuclear forces. To fight a long or "protracted" war, forces must be "capable of enduring survival"—a new criterion of effectiveness by which they and their equipment must now be judged.

One troubling aspect of the long-war concept is that it has not yet been satisfactorily defined. Does the term mean protracted for days, weeks, or months? Current policy statements do not offer any specific guidance, but a long war certainly means that nuclear forces must maintain a surviving capability of some substantial period of time beyond an initial exchange of fire.

In addition to preparing for a long war, Reagan policy calls for a warfighting strategy. Secretary Weinberger declared that this nation must prepare to *fight* a nuclear war in order to strengthen the credibility of US deterrence.¹¹ The link between warfighting and deterrence has to do with the three-part equation of deterrence—one part adequate forces, one part the will to use those forces, and one part belief by the enemy (Soviets) that the other two parts exist. Serious attention to warfighting may strengthen all three parts of the equation.

The Soviet notion of deterrence has been much more aligned with the warfighting potential of nuclear forces, that is, their ability to fight and win, than have earlier US concepts of assured destruction.¹² A US deterrent posture founded on

forces and plans geared for warfighting strengthens Soviet perceptions of our deterrent strength. Initiatives by the President and the Secretary of Defense to rebuild the US economy's ability to sustain a general war also serve to strengthen the credibility of a declared warfighting strategy.¹³

On 2 October 1981, President Reagan spelled out other aspects of this approach to nuclear warfare in a comprehensive program to modernize strategic weapons. Two of the five parts of this program specifically support a prolonged nuclear war—strengthening and rebuilding communications and control systems and improving both air and civil defense.¹⁴

IMPLICATIONS OF NEWLY DEFINED POLICY

What are the collective consequences of these recent shifts in nuclear policy? First, there are obvious implications for the characteristics of the nuclear weapons required. To fight a long war, weapons must survive and endure, so survivability and sustainability take on added importance, as does the flexibility necessary for targeting and employment of weapons.

In today's strategic triad, US bombers, submarine-launched missiles, and land-based missiles cannot comfortably support a warfighting strategy for a long war. Because bombers not on alert (ready-to-launch condition) are presumed destroyed in a nuclear attack, in routine day-to-day conditions (when the United States is most vulnerable to a Soviet surprise attack), about 70 percent of the bombers might not survive to fight a long war. In times of increased tension, nearly all US bombers could be placed on alert, but once bombers are launched, they require surviving recovery bases to continue to be useful.

Submarines not deployed at sea are also assumed to be destroyed in a nuclear attack, so part of the submarine missile fleet might be lost under routine alert conditions. Like bombers, nearly all submarines can be made ready to support an imminent war, but submarines currently lack the excellent C³

that bombers and land-based missiles enjoy, and submarine-based missiles do not have sufficient accuracy and large enough yields to be used effectively against hardened military targets. As the Soviets continue to construct hardened shelters to protect their leadership and industry, US weapons capable of attacking hard targets will become increasingly important.¹⁵

Land-based missiles have excellent C³, possess the pinpoint accuracy for lots of flexibility, and are capable of destroying hardened targets, but their current survivability rating against a nuclear attack—the probability they would ride it out—is low.

In sum, today's weapons are limited in their ability to survive a war lasting more than a few days and still be flexible enough to attack a broad range of targets. These shortcomings require changes to current systems and pose new design requirements for future weapons.

A second important consequence of these freshly stated policies has to do with US employment policy for nuclear weapons. Changes have occurred in a gradual, evolutionary manner. The document which prescribes how and when to use nuclear weapons, the SIOP, has matched the gradually increasing demands for more flexibility by incorporating options that allow certain weapons to be withheld. The SIOP was already tightly stretched to cover the options required by nuclear policy prior to PD-59. With the additional demands of PD-59 for more flexibility to attack additional classes of targets, the SIOP may have reached the limits of its elasticity.

Furthermore, planners naturally pay most attention to weapons used in a single attack. However, for a long war, planning beyond the initial strike or exchange becomes significantly more important. In fact, strategic reserves may be more relevant to success in a long war than the weapons used in an initial attack or retaliation. Given the strains on today's SIOP and the additional demands of new strategy, I would argue that a refined or reoriented approach is necessary.

A third set of consequences involves systems that support strategic nuclear weapons. Communications networks that provide command and control of forces, for example, are critical and must survive to provide reliable channels for command information throughout a long war. A command authority that can survive to give the necessary orders must be supported by intelligence information about enemy forces and their disposition, which in turn requires that sensors and agents survive to gather intelligence and that equipment survives to process it. Information about enemy forces and their disposition is not only vital; information about US forces is also essential.

For these same reasons war-sustaining measures take on added importance. Recovery and reuse of bombers and land and sea missile-launchers become an operational necessity. "Recovery and reconstitution," as the process for rearing surviving or unused weapons is generally called, has not previously received the attention that it now deserves. To achieve sustainability, US concepts of logistics support must now extend beyond preconflict readiness into a structure which can survive and function in a long war.

In essence, a requirement for forces capable of surviving and enduring in a long nuclear war will have great impact on the weapons we acquire, the policies we select to implement our strategy, and the systems, plans, and procedures we use to support such a war. A responsible solution of this problem requires resolving the strategic dilemma posed by a potential policy, force, and strategy mismatch. Our national doctrine calls for the ability to fight a long nuclear war, but the forces and policies supporting this "new strategy" are just evolving. Where then, do we go from here?

2. UNDERSTANDING THE PROBLEM

We need a common level of understanding to appreciate the mismatch among strategy, force, and policy. Many unfamiliar or ambiguous terms and important aspects of nuclear warfare warrant discussion in contrasting US and Soviet approaches to general war and its ultimate manifestation, nuclear warfare. Understanding the different approaches is important because they have generated the US evolution of a warfighting posture and the ways we assess the adequacy of US nuclear forces and policies.

US VERSUS SOVIET APPROACHES TO NUCLEAR WARFARE

Over the last ten years, US nuclear policy has evolved towards more flexibility and complexity, to match the increasing needs of national strategy. Although growing more difficult to implement, national strategy continues to be based upon deterrence, enforced by threat of a punitive retaliatory strike. For years a key feature of this approach was its concentration on basically *one* retaliatory attack. The attack was to be preplanned, flexibly executed either by exercising suboptions of smaller groups of weapons or as a single massive strike. The plan specified how to employ survivable reserve forces, but it did not detail how to fight the long war that is now also assumed in planning nuclear strategy.¹

Although today's nuclear employment policy enforces a strategy of deterrence with a preplanned flexible response,

the probable loss of the command and control structure essentially limits the practical implementation of US nuclear war plans.

In the United States planners have often been reluctant to tackle the "unthinkable" long war and deal with the loathsome details of such an abhorrent subject. The repugnance of this topic as well as the convenience of not needing to plan beyond a single strike-counterstrike kept strategic thinkers away from serious public examinations of nuclear warfighting. Limited resources, too, made the short-war scenario easier to deal with.

The shift in national strategy to considering a long war, of course, revealed some limitations in the SIOP approach as an implementer of "new strategy." Emphasis on the preplanned attack requires less effort (and less supporting planning) than do the transattack and postattack phases. Planning for the reuse of bombers, submarines, and missiles draws secondary attention, a natural consequence of the short-war emphasis. Both in weight of planning and in the physical allocation of weapon systems, the initial retaliatory attack enjoyed first call, and almost exclusive call, on all resources until the new long-war strategy developed.

Planning for supporting systems like command, control, and communications has also reflected the SIOP emphasis. These systems are designed to ensure the one-time reliable receipt of an attack message at the initiation of war. They were not specifically designed for two-way communications or for subsequent attack messages during the war. (I will examine the consequences of these limitations on the conduct of a long war in chapter 3.)

Soviet military strategists see nuclear warfare in ways fundamentally different from those of the United States. Their view of deterrence, war prevention, rests on the threat of being able to defeat a potential enemy.² This view flatly rejects the notion of "mutual" deterrence, which includes concepts of assured countervalue (economic as opposed to military) targets at risk.³ Moreover, the Soviets see war as a continuum

and nuclear weapons as indispensable to victory in the "decisive phase" of the evolving war. To them, the value of nuclear weapons thus lies in their destructive potential together with their judicious application at the appropriate time.⁴ Timing holds an important place in the Soviet catalogue of war parameters and is essential in their assessment process.

In the Soviet approach, global nuclear war is divided into several periods: (a) the threat period (a period of preparation), (b) the war period, and (c) subsequent periods of war. The initial phase of the war period is seen as lasting several days or, at most, weeks. The Soviet concern with follow-on or subsequent periods is apparently based on their conclusion that it is impossible to destroy an adversary completely in one simple, quick attack.⁵

The foregoing suggests that the Soviets view war as a multiple-exchange proposition, not confined to a short period of time. The Soviets also seem not to calculate the military balance as we do. The Soviets assert that when calculating the military balance, relative strength comparisons must include defense capabilities, tactical operational power, targeting intelligence, offensive destructive power, and assessment of command, control, and communications.⁶ These factors significantly expand the variables included in calculating the military balance beyond offensive destructive power.

One final point about the Soviet approach to nuclear war, by not compartmentalizing their nuclear weapons into "strategic," "tactical," "theater," and "regional" categories, the Soviets avoid the fallacy of thinking about a nuclear exchange (with the United States) only in terms of their "central strategic systems" (long-range bombers and land-based and sea-based intercontinental ballistic missiles (ICBMs)). Rather, Soviet offensive forces have a flexible nuclear strike capability that encompasses three levels of nuclear operations: (a) intercontinental nuclear exchanges, (b) strategic theater wars, and (c) tactical theater wars.⁷ Their more pronounced attention to the operational utility of nuclear weapons in a variety of situa-

tions indicates that all such weapons are a part of the Soviet calculus of nuclear warfare.

MEASURING NUCLEAR WAR

A host of problems are associated with measuring the effectiveness of nuclear weapons. History offers no comparable base of experience from which planners can systematically extract formulae for the effectiveness of nuclear weapons and tactics, nor can nuclear weapons be conveniently or realistically tested during peacetime. To compensate for these uncertainties, planners have evolved several different measurement methodologies.

A Link Between the Strategic Balance and Deterrence

One seemingly straightforward way to assess the adequacy of a nuclear force posture is to compute the so-called strategic balance. A simple way to do this is to count and then compare the number of weapons in each nuclear arsenal. A strategic balance might exist if both arsenals had about six thousand weapons, but might not if one side's weapons were bigger, or were carried by different delivery systems, or had better alert rates or accuracies.

Such asymmetries are characteristic of the differences between US and Soviet arsenals. Compared to the United States, the Soviets have more land-based missiles, fewer bombers, and more submarine-based missiles. Soviet land-based missiles are larger and carry more total warheads. Virtually none of the smaller Soviet bomber fleet is on routine alert, whereas about 30 percent of ours is. Their submarines, though more numerous, have a smaller percentage equipped with multiple warheads than do US submarines. Additionally, the Soviets keep a low percentage of their submarines on routine patrol.⁹ Past editions of the *Department of Defense Annual Report* have used such comparisons of US and Soviet strategic forces as a measure of the strategic balance. Table 2-1, for example, is drawn from the fiscal year 1982 report.

Table 2-1. US and Soviet Strategic Force Levels

	1 January 1980		1 January 1981	
	US	USSR	US	USSR
Offensive				
Operational ICBM Launchers ^{1, 2}	1,054	1,398	1,054	1,398
Operational SLBM Launchers ^{1, 3}	656	950	576	950
Long-Range Bombers (TAI) ⁴				
Operational ⁵	348		347	
Others ⁶	225	156	223	156
Force Loadings ⁷				
Weapons	9,200	6,000	9,000	7,000
Defensive⁸				
Air Defense Surveillance				
Radars	88	7,000	91	7,000
Interceptor Aircraft (TAI)	327	2,500	312	2,500
SAM Launchers ⁹	0	10,000	0	10,000
ABM Defense Launchers	0	64	0	32

1. Includes on-line missile launchers as well as those in construction, in overhaul, repair, conversion, and modernization.
2. Does not include test and training launchers or 18 launchers of fractional orbital missiles at Tyura TAM Test Range.
3. Includes launchers on all nuclear-powered submarines and for the Soviets, operational launchers for modern SLBMs on G-class diesel submarines. Excluded are 48 SALT-Accountable launchers on three Polaris submarines now used as attack submarines.
4. Exclude 1981 figures for the United States: 65 FB-111s, for the USSR, over 100 Backfires, about 120 Bison tankers, Bear ASW aircraft, and Bear reconnaissance aircraft.
5. Includes deployed, strike-configured aircraft only.
6. Includes, for US, B-52s used for miscellaneous purposes and those in reserve, mothballs or storage, and four B-1 prototypes. For the USSR, Bears and Bisons used for test, training, and R&D.
7. Total force loadings reflect those independently targetable weapons associated with the total operational ICBMs, SLBMs, and long-range bombers.
8. Excludes radars and launchers at test sites or outside North America.
9. These launchers accommodate about 12,000 SAM interceptors; some of the launchers have multiple rails.

Source: US, Department of Defense, *Annual Report, Fiscal Year 1982* (Washington, DC: Government Printing Office, 1980), p. 53, table 4-2.

This type of comparison is useful, but it demonstrates the obvious difficulties in trying to assess the "balance" between two dissimilar strategic arsenals. A logical next question to ask is, "Are such comparisons meaningful, because the two forces might have been built for quite different reasons and designed to accomplish quite different tasks?"

In an attempt to provide an answer, a way to assess the adequacy and effectiveness of US nuclear weapon systems, strategic analysts have developed several different measures. Because the study of nuclear war must be conducted hypothetically, these measures involve estimates of performance and assumptions about how the weapons will be used. Each measure is slightly different from the others, and there is no commonly accepted standard measure. (A comparison of several measurement methodologies is contained in the appendix.)

Limitations of US Measures

Typically for US strategic analyses, war outcomes are measured after only one attack and counterattack. In fact, most computer programs are not designed to handle multiple-exchange analysis. As a further limiting simplification, the attack and counterattack are assumed to occur instantaneously; that is, the computer program does not take any elapse of time into account. This lack of time accounting clearly prevents meaningful analysis of a multiple-exchange war. Without time as a part of the equation, forces and attack conditions remain static throughout the war—an acceptable simplification for a short war, but obviously inadequate for a long war.

For a short war, "executing" the forces through an authorized order from the President requires a command and control system which will survive only long enough to disseminate the initial message. Consequently, most dynamic analyses assume perfect performance by the command and control system throughout the war. Several current studies suggest

that this simplifying assumption needs to be seriously reexamined.⁹ Some ability to describe command and control systems as a function of time is essential to evaluate a multiple-exchange war.

Other limitations cause measurement problems even if the war should turn out to be a single exchange. The US approach to nuclear warfare is derived from US geographic status as a separate continental power. From this perspective, *nuclear wars are fought between two continents*, North America and Eurasia. Thus strategic systems are categorized as long-range, continent-to-continent bombers and land-based and submarine-based missiles. This view of nuclear weapons can limit planners to computing the outcome of nuclear exchanges only in terms of strategic systems. The inability to quantify the contributions of theater and regional nuclear weapons make analyses of nuclear war especially difficult.

As an interesting counterpoint, the Soviets reject this compartmentalized view of strategic systems and insist instead that, irrespective of origins or basing mode, weapons that can hit Soviet territory are strategic.¹⁰ A general war involving multiple exchanges of nuclear weapons is almost certain to include every military force and weapon at each country's disposal, including theater, regional, and other tactical nuclear weapons.

Other problems arise because of our tendency to ascribe US values and motivations to the Soviets in US-developed hypothetical nuclear scenarios. Since we cannot know or measure intent, we base estimates on capabilities. However, what is important and valued by the United States as a strategic target may not be equally valued by the Soviets. Even our measurement criteria, selected from a US perspective, may be less important or even inappropriate from the Soviet view. For this ethnocentricity, US war planners have been accused of "mirror imaging" in estimating Soviet attack plans.¹¹

Nuclear weapons have a utility beyond their capacity to inflict massive physical damage, from coercion to deterrence of coercion, as in the US "nuclear umbrella" of the North At-

lantic Treaty Organization. These dimensions of nuclear warfare do not lend themselves to easy quantification and are therefore absent from current assessment schemes and measures of nuclear force capability. These additional aspects of nuclear weapons are both important and relevant to nuclear policy. Measures derived from strategic analyses must therefore be considered as only partial indicators of the adequacy of nuclear forces and their supporting policies.

A CACOPHONY OF NUCLEAR POLICIES

Beside the debate about how one measures nuclear weapons, uncertainty about the meaning of certain key terms adds to the confusion. Thus we must define the various kinds of policies which comprise nuclear policy and provide working interpretations for terms such as "long war."

One area needing clarification is that of the development of policies associated with nuclear warfare. Historically, US nuclear policies have not necessarily developed in concert—until recently. I would like to emphasize how crucial it is to sustain the present movement toward close coordination of policy evolution.

Declaratory policy is the extant collection of public pronouncements about administration aims and objectives. Nuclear declaratory policy is contained in formal Government reports and statements and in speeches by high-level Government spokesmen. Examples of reports include the President's annual foreign policy report and the annual military posture statements by the Secretary of Defense and the Chairman of the Joint Chiefs of Staff. Public statements include congressional testimony, statements to NATO, and speeches to appropriate audiences. Declaratory policy is meant to be deliberate—it is what we want to convey to friends and adversaries about US nuclear forces and about how we intend to use them. The emphasis the United States has chosen to place on declaratory policy has changed as part of the evolution toward planning for long-war strategy.

Procurement policy is that set of regulations and procedures governing the acquisition of weapon systems. These procedures and regulations are usually broadly applicable to the procurement process without distinction as to whether a nuclear weapon is involved. Office of Management and Budget Circular A-109, "Major Systems Acquisitions," for example, applies equally to a new tactical fighter aircraft or an intercontinental missile. Some regulations are tied directly to nuclear systems procurement, particularly where nuclear warheads are concerned. (See, for example, Army Regulation 70-24, "Special Procedures Pertaining to Nuclear Weapon Systems Development and Acquisition.")

A third category in policies, *employment policy*, concerns the use of nuclear weapons. This policy provides the careful translation of national strategy and doctrine into the ultimate matching of weapons to targets. The process is implemented through sensitive classified documents originating with the President and the National Security Council. Historically, employment policy has been founded on a National Security Decision Memorandum, NSDM-242, and amplified by Presidential directives (PD-59 is the latest). The Defense Department translated this national guidance into Nuclear Weapons Employment Policy (NUWEP), prepared by the Secretary of Defense in response to NSDMs and PDs. Finally, the Joint Chiefs of Staff developed the SIOP to satisfy the specific guidance provided by NUWEP.¹² Recent modifications have refined employment policy.

The SIOP is a capabilities plan which implements employment policy embodied in the NUWEP. The SIOP attempts to meet NUWEP criteria by matching currently available weapons against specific targets.¹³ "Laying" the SIOP is a process of doing the best you can to meet the demands of national guidance within the limitations of current forces.

Arms control policy, a fourth category, deals with policies which guide international discussions on arms limitations or arms reductions. General arms control policy guidance is

scarce, but PD-50 provides specific goals for negotiations involving strategic nuclear arms.

Although not generally considered a separate policy category, the procedures for command and control of war also receive special attention in the form of Presidential guidance on protection of the Presidency during a war, on how command of US nuclear forces is transferred in a prescribed order, and on "continuity of government." Presidential Directive 53, "National Security Telecommunications Policy," calls on the nation's telecommunications to provide for (a) connectivity between the NCA and strategic and other appropriate forces and (b) responsive support for operational control of the Armed Forces.

All of these compartmentalized policies provide guidance on some aspects of nuclear warfare and are necessary to an informed discussion of the policy implications of multiple-exchange war. Although related, these policies are not necessarily developed with due regard for their mutual impacts. Nor is there always a sufficient appreciation of the length of time it takes to implement a policy once it is announced. (In chapter 4, I will expand on the problem of policy integration and implementation.)

What Is a Long War?

Any attempt to grapple with the nation's newly formulated requirement to deal with the possibility of a long nuclear war immediately runs into additional definitional problems. One of the most important is understanding what differentiates a long nuclear war from a short nuclear war.

Most recent discussions of the long-war strategy use the term *protracted war*.¹⁴ A closely related phrase, *protracted conflict*, has the connotation of defining the Soviet view of its long-range adversarial relationship with the United States.¹⁵ To prevent confusion, I will avoid the term *protracted* in conjunction with references to a long nuclear war.

One way to get at a useful meaning is to contrast the differences between a long nuclear war and a short nuclear war. Although agreeing on what constitutes a short nuclear war (a massive US-USSR attack and counterattack using most or all of both sides' nuclear weapons), experts do not agree on what specifically differentiates this familiar notion from the unfamiliar long war. This lack of consensus about the specifics—length of time, number of attacks, and tactical scenarios—adds to the confusion. Experts do not even agree about how such a long war could start, or how it might evolve.

In an attempt to deal with this tough problem of reaching a common understanding, the Department of Defense has initiated detailed studies on long nuclear war. One such study, begun in 1982 by the Air Force as the executive agent for the DOD, attempts to meet these definitional issues head-on.¹⁶

For our purposes, by selecting those features of a long nuclear war on which there is agreement, I will offer an interpretation to serve for the remainder of this paper. Since a long war clearly involves more than one nuclear exchange (attack and counterattack) over some indefinite period of time, a long nuclear war may be suitably characterized as a multiple-exchange war. This definition of a long war distinguishes it from previous concepts of essentially a single massive retaliation (albeit with the flexibility to execute the retaliation piecemeal). The term *multiple-exchange* provides the right connotations (planning must concentrate on initial and follow-on strikes and counterstrikes), while at the same time sidestepping arguments about how long is "long."

What Is a Countervailing Strategy?

Other interpretation problems still remain, however. Secretary of Defense Harold Brown's term *countervailing strategy* has generated confusion among nuclear planners. Although explained in both his Newport speech in August of 1980 and the *Department of Defense Annual Report for Fiscal Year 1982*, the question remains, "How does one countervail?" To the extent that PD-59 embodies a countervailing strategy, the

policy this document offers is not as easy to apply as policy implementers would wish.

What Does Deterrence Mean?

If strategic nuclear policy is to enforce a national strategy of deterrence, then what is meant by deterrence ought to be unambiguous. Here again, some uncertainties exist.

A key feature of the rationale justifying the need for more flexibility in nuclear planning and the need to prepare for a multiple-exchange war is that such aspects of US nuclear policy are designed to directly address Soviet perceptions of deterrence directly. The Soviets evidently see utility in warfighting and in the use of nuclear weapons to ensure victory in war, current declaratory statements notwithstanding.¹⁷ So they will feel "deterred" if we threaten them in ways they understand.

Residual ambiguity over the appropriateness of US deterrence policy can still cause problems. Some argue against the necessity for a warfighting posture, and assert that the assured ability to destroy the most populous Soviet cities is a powerful—even adequate—deterrent. The adequacy of a deterrent posture is difficult to assess, of course; because it exists in the mind of the deterred, it cannot be measured directly, only inferentially. If war breaks out, deterrence was inadequate. The absence of war, however, is not sufficient to confirm its adequacy. The nub of the deterrence issue is whether or not a warfighting posture increases the *confidence level* of US nuclear deterrence. The Reagan administration offers the persuasive argument that a warfighting posture strengthens deterrence because it deploys US nuclear force in the manner that is most respected and feared by the Soviets.

With this understanding of the meanings, measurement schemes, and policies which relate to nuclear warfare, we are now ready for the next step, examining in detail those factors which influence the ability to plan realistically for and execute a multiple-exchange war.

3. FACTORS INFLUENCING A MULTIPLE-EXCHANGE WARFIGHTING CAPABILITY

The strategy of a multiple-exchange war will impose many new demands on strategic forces and policies and on plans to implement the "new strategy." Beginning with the triad of strategic nuclear weapons, what are the limitations of current forces and policies?

LIMITATIONS OF CURRENT FORCE STRUCTURE

Forces-in-being are what count in a short war. The multiple-exchange war will demand that nuclear weapon systems survive long enough to be usable throughout the war. In the words of Secretary Weinberger, "Our forces must be capable of enduring survival."¹ Endurance, however, also depends on a survivable logistics support system that can sustain weapons systems at a continuing high state of readiness. Current logistics systems are designed primarily for pre-war support. To function in a long war, logistics support will require designed-in survivability, supplemented by adequate planning and provisioning. Plainly, the enduring survival required for warfighting a long war means that weapon systems and also some complementary support systems must survive.

Weapon System Deficiencies

In addition to the traditionally important strategic elements of passive and active defenses, forces must meet that vital criterion of the warfighting strategy—flexibility. Flexibility in the PD-59 sense means the ability to attack a variety of targets, including counterforce, that is, hard military targets. For utility in a long war, flexibility also means ease in changing targets, ability to attack mobile or previously unlocated targets, control of collateral damage to nearby areas through small yields (selectable if possible), good accuracy, the ability to attack targets quickly, and the flexibility to hit widely separated or isolated targets.

To fight a multiple-exchange war, nuclear weapons systems must now satisfy several new criteria: endurance, survivability, sustainability, and flexibility. Each of the weapon systems in the strategic triad can be examined to see how it measures up to the metrics of the new strategy.

Strategic bombers survive by not being where nuclear missile warheads burst. Ready aircraft park in special holding areas adjacent to the runway in a ready-to-launch condition, loaded with fuel and bombs. Flight and ground crews are nearby, on alert or subject to short recall. At present about 30 percent of US strategic bombers (B-52s and FB-111s) are in this condition. Upon receipt of tactical warning (data from sensors confirming an imminent nuclear attack), the Commander in Chief of the Strategic Air Command (SAC) can order the airplanes to take off. The time from notification until planes are airborne is short enough so that aircraft can take off before enemy missiles hit.

In times of high international tension, nearly all SAC bombers can be made ready for immediate takeoff. If the state of tension is prolonged to the point that engines are running on the ground or aircraft are actually airborne precautiously, the number of bombers on alert may decrease as parts start to fail under the stress of these fully alert-ready conditions. Indeed, a recent General Accounting Office report estimates that bombers could not endure for more than thirty days under conditions of high-alert readiness.²

Those airplanes not on alert should be presumed destroyed in a nuclear attack on the airfield. Enduring survivability for bombers depends on escaping attack, which probably depends on being airborne. Bomber ability to remain aloft is limited primarily by engine oil because fuel can be replenished by aerial refueling. Refueling, in turn, depends on airborne tankers (KC-135s, KC-10s) which have the same survivability problems as bombers.

The B-52 can stay aloft for a limited number of hours before increasing probabilities of engine failure become a factor.³ In a multiple-exchange war, bombers must be able to take off before coming under ground attack and, after accomplishing their assigned mission, land safely, reload, and take off again. In a lightly loaded condition (gross weight of about 260,000 pounds, including bombs and enough fuel for about one thousand miles of flight), B-52s require a runway length of about 4,500 feet for takeoff.⁴ A recent survey lists about 450 airports in the United States with runways of this length which are wide enough to accommodate B-52s.⁵ Given the approximately seven thousand nuclear weapons available to the Soviets, the survivability of these US runways is questionable.⁶ Some bombers could possibly survive by using alternate landing sites somewhat less than 150 feet wide.

Bombers are perhaps the most flexible element of the triad and suit the newly defined strategy well in that regard. Their ability to seek and destroy with accuracy suitable for hard targets, combined with on-the-scene human evaluation, is unique. However, the Soviets have an extensive array of defenses against US bombers, and penetration of the Soviet airspace will be difficult. The six-hour to eight-hour response time of bombers is slow compared to missiles, and the fragility of bases, bombs, fuel, spare parts, and crews necessary to sustain strategic bombers in an enduring manner is a serious problem, mitigated only by the possible damage to Soviet defenses by missiles before bombers reach Soviet territory. Destruction of the B-52 central supply depot at Oklahoma City Air Logistics Center, for example, could decimate logistics

support for a multiple-exchange campaign, forcing the United States to depend upon war reserve spares.

The current problems with land-based missile survivability are well known. They cannot survive a direct nuclear hit. Missiles can survive a near miss because they are hardened and can operate several days on diesel backup generators if commercial power is lost. Diesel backup power systems for Minuteman have been notoriously temperamental, suffering switchgear failures and overheating; in spite of intense corrective attention, Minuteman's power system still occasionally fails to take over from commercial power. If diesel power is lost, missile systems will function on batteries for several hours. A change to the newly improved lithium batteries for some two hundred Minuteman missiles, scheduled to be completed by 1986, will provide approximately fifteen times greater battery endurance. Missiles are flexibly able to change targets *before* launch, either to one of several prestored targets or to additional targets loaded by the launch crew using the new computer-controlled targeting system called Command Data Buffer. The excellent accuracy and short time of flight for those ICBMs that do endure suit them ideally for the counterforce targeting role.

As ICBMs are designed to be self-sufficient, they can survive with minimal maintenance support for the short term (several weeks). Long-term logistics support for land-based missiles, however, currently depends heavily on the survivability of Ogden Air Logistics Center in Utah and Newark Air Force Station in Ohio, neither a hardened facility.

Submarine-based missiles rely on concealment in the broad ocean areas for their survivability. Like bombers, submarines not on patrol and in port (normally about one-half of the force) probably will not survive a nuclear attack. At sea, on the other hand, submarines are considered the most survivable force in the strategic triad. Well provisioned, patrol for each nuclear-powered submarine is limited essentially by food for the crew.⁷ Reprovisioning for longer endurance during a multiple-exchange war would require equipment and planning not currently available.

Submarine-based missiles lack the high accuracy of land-based missiles and the large warhead size, as well, so they are not as effective in attacking counterforce targets. Submarines also lack the responsive command, control, and communications that bombers and land-based missiles possess.

In essence, each of the triad forces is deficient in one or more characteristics desired for a credible multiple-exchange force.

Force Posture Implications

The way in which the triad forces are now used would cause problems in a long war. Two aspects of how strategic forces are now postured are troubling in light of the "new strategy." The first concern has to do with alert versus nonalert forces. Recall that the percentage of strategic nuclear forces on normal day-to-day alert (armed, ready to launch) varies from nearly 100 percent for land-based missiles to approximately 30 percent for bombers. Strategic planners agree that bombers and submarines not on alert can be easily destroyed. A surprise attack could therefore eliminate nearly 90 percent of ICBMs and 70 percent of bombers. In times of increased tension, when all strategic forces can be placed on full alert, the problem decreases considerably although, as noted earlier, the strains of maintaining full alert for bombers will gradually reduce the number operational.

The second related aspect of force posture deals with reserve forces, those forces designated to be set aside from the initial exchange. This concern has two parts. First, the proportion of strategic forces so designated is small, a logical result because most weapons are assigned to the retaliatory strike to make it massive, and thereby a stronger deterrent. Secondly, the survivability of those weapons held in reserve is linked to that of the forces from which they are drawn and may be equally low. It appears that today's force posture affords expectations that few weapons will survive for use in nuclear exchanges beyond the initial one.

LIMITATIONS OF SUPPORT SYSTEMS

The prosecution of a multiple-exchange war is vitally dependent upon those systems which directly support strategic nuclear weapons. Here too, some important limitations hinder implementation of the "new strategy." Perhaps the most obvious inadequacies have to do with the command, control, communications, and intelligence (C³I) systems.

Inadequacies of Strategic Command, Control, Communications, and Intelligence Systems

Commanding strategic forces in a short nuclear war is a reasonably straightforward proposition. The preplanned SIOF and its options for executing the retaliatory strike wait in place. To launch nuclear forces, the NCA (the President or his designated successor) must transmit a one-way command message which properly authorizes the launch and designates selected launch options. Successful dissemination of this initial launch message, called the Emergency Action Message, is the *essential* requirement of the C³ system. Two-way communications and C³ survivability beyond the initial force execution are desirable but not essential in a short nuclear war. For a multiple-exchange war however, essential demands on the C³ system increase enormously.

During a long war, information will become a critically valuable commodity. The outcome will probably depend on possession of essential information, both about your own forces (How many; how badly damaged; where are they; when will they be available for a follow-on strike?) and about the enemy's forces (Where are they; are they preparing for restrike; does he have more remaining usable forces than I do?). The latter category of information is usually called intelligence, and in strategic planning is considered with C³ as a part of the C³I system. Clearly, the ability to locate and retarget the enemy's remaining weapons and forces and thereby deny him a usable strategic reserve is a crucial objective of a long war.

Intelligence data are particularly critical during a long war as a source of damage-assessment information to allow retargeting of remaining weapons. Successful prosecution of a multiple-exchange war will require that plans and procedures guarantee adequate survival of US intelligence acquisition and data processing equipment.

Information about our own forces requires a survivable two-way communications system so that commanders can ask for and receive status-of-forces information. Command of a multiple-exchange war will also depend on a survivable system to allow repeated dissemination of launch orders for successive strikes.

Two-way communications makes a great deal of sense for other reasons as well. A strong motivation for the flexibility called for by PD-59 and the warfighting strategy is the desire to limit damage and the amount of violence to the lowest levels possible—in other words to control escalation of the war. The practical implementation of this desired objective rests on an adequate evaluation and response mechanism—a survivable two-way C³I system. Other obvious uses of an enduring C³I capability include war termination, control during the postwar period, and a host of tasks associated with postwar negotiations and reconstruction.

Unfortunately, the present C³I system is only marginally adequate for its current tasks and inadequate for the "new strategy." System deficiencies have long been recognized. In announcing his five-part program to modernize US strategic weapons, President Reagan characterized the communications and control system as "a much neglected factor in our strategic deterrent."⁸ The Under Secretary of Defense for Research and Engineering, Dr. Richard DeLauer, sums up the present predicament this way: "As a result of six or seven years of neglect, we don't have strategic connectivity."⁹ Today's C³I system is in danger for a number of reasons, seven of which follow:

First, the system to disseminate the Emergency Action Message relies on a few nonhardened "nodes" (telephone

switch stations), which presents an easy targeting opportunity for Soviet planners. In the words of General Ellis, former Commander in Chief of SAC:

Today's C³ systems were conceived in the late 1950s and most became operational in the 1960s. They are essentially peacetime systems located at fixed sites and dependent on ground communications networks; they are, like all known fixed sites, highly vulnerable to attack.¹⁰

Second, alternate means of dissemination include broadcast over various radio frequencies. High-altitude air bursts of nuclear weapons are known to cause severe blackout of radio signals in the high-frequency spectrum, again presenting the Soviet planner with an opportunity to disrupt radio communications.

A third factor, the Emergency Rocket Communications System is an important means of "executing" the bomber force after bombers have been launched under what is called positive control. (If an attack is imminent, the Commander in Chief of SAC may launch the bomber force *before* the President orders a nuclear strike. Bombers so launched may not proceed beyond a predetermined point without receiving a strike or execution order.)

The Emergency Rocket Communications System consists of a transmitter in place of a warhead on several Minuteman missiles. The Emergency Action Message must be received, then recorded in the missile's transmitter. After launch, the transmitter repeats its recorded message to listening strategic forces. To ensure survivability, missiles must launch prior to coming under attack; otherwise they are subject to damage either before launch or just after launch because of nearby nuclear explosions. A carefully timed attack designed to disable this system could be effective if there are delays in the decision to launch strategic forces.

A fourth factor, the full panoply of strategic command and control systems includes aircraft command centers, Post-Attack Command and Control System aircraft, which serve as airborne communications relay stations. These aircraft rely on

tactical warning of an impending attack in order to survive. Their reliance on tactical warning is a weakness potentially exploitable by a carefully planned surprise attack. In periods of increased tension, these aircraft remain airborne and so are not susceptible to attacks on ground targets. Their transmission frequencies may still be susceptible to nuclear blackout effects, however, which could be disruptive.

Fifth, the US command and control system has few hardened command centers. Considering the surfeit of weapons available to the Soviets, together with the excellent accuracy and large warheads of their missiles, the survivability of command centers, like the White House, the Pentagon, Cheyenne Mountain, Fort Ritchie, and Offutt Air Force Base, is highly doubtful.

Sixth, the control portion of the command and control system is highly dependent on computer support for data handling and processing. The concept of a central control authority depends on the synthesis of vast amounts of force-status, damage, targeting, intelligence, and diplomatic data, processed into condensed formats useful for command decisions. Like the command centers they support, the data processing equipment designed as a part of the C³I system is concentrated in only a few locations. Nuclear attacks are likely to disrupt data support first, as today's computers are susceptible to damage by high levels of electrical energy associated with nuclear bursts (the electromagnetic pulse effect) as well as physical damage by blast and heat.

The seventh factor, the C³I system was not designed for, nor does it handle well, the process of two-way communications. As a result, C³I cannot accommodate rapid retargeting, which limits its responsiveness in a long war. But, a two-way conversation isn't necessary to accomplish the SIOP in a short nuclear war. However, two-way communications after the war starts will be limited by lack of surviving communication systems and nuclear blackout effects. The difficulties affect each strategic system differently.

Submarines operate normally in the receive-only mode, so two-way communications would require a change in their operating procedures. Any communications with submerged submarines is a difficult technical problem. Developing and employing means of two-way transmission which do not reveal the submarine's location may prove infeasible.

Aircraft generally transmit on frequencies which require line-of-sight transmissions. Two-way transmission over enemy target areas is difficult but can be done if planners believe in the need and put adequate money into solutions.

Land-based missiles have the most comprehensive set of communications systems of any of the triad forces; these many alternative paths provide high confidence that the missile crew will receive launch messages promptly. Two-way communications rely on the crews in their launch control centers (one for every ten Minuteman missiles, one for each Titan II missile). If the launch control centers are destroyed, Minuteman missiles can also be launched from specially configured KC-135s called the Airborne Launch Control System (ALCS) aircraft. One ALCS is continuously airborne, even during normal alert conditions. The ALCS allows only one-way transmissions of launch commands to missiles. A recent proposal to modify the ALCS (called ALCS Phase III) has been disapproved. This modification would have allowed two-way communications between the aircraft and selected missile launch sites to obtain force-status information.

The Pentagon is currently analyzing how to enhance communications for strategic nuclear forces.¹¹ The results so far are encouraging, and there may be some useful improvements that can be made within the next few years to enhance C³I's ability to handle the multiple-exchange role.

Difficulties of Ensuring a Surviving Presidency

The concept of a warfighting strategy, together with the centralized command and control this nation requires for its nuclear forces, makes imperative a survivable, "properly con-

stituted" command authority to direct the US war effort. *Properly constituted* as used here means several things. First, the command authority is a responsibility of the Presidency and must devolve in an authorized manner as the Presidency devolves. If the President chooses to delegate his NCA responsibility in wartime, these procedures must be clear and well understood *before* the war starts. Second, the acting NCA must establish and verify his authenticity to confirm his authority. There must be absolutely no question as to who is in charge of US nuclear forces. This issue could be a serious problem in wartime if the President somehow becomes separated from the C³I system. And, whoever does take charge must survive.

The survivability of the NCA is closely linked to the vulnerability of his location. As discussed above, the few primary and alternate command centers, although hardened, are not likely to survive for long. Command centers located on the East Coast (the White House, the Pentagon, Fort Ritchie) can be attacked in less than ten minutes from Soviet submarines in Atlantic patrol areas, followed up by attacks from Soviet land-based missiles in another fifteen minutes.¹² A surprise attack might be able to decapitate US strategic forces by severing its command head. If the President survived but could not or did not issue launch orders before communication terminals came under attack, US missiles would forfeit the option to launch under attack and be forced to ride out the incoming attack, suffering considerable losses. These losses could include most of the Minuteman communications system (ERCS), which further exacerbates the problem of follow-on communications.

One hope for the President's survival may reside in his rapid escape to Andrews Air Force Base where the National Emergency Airborne Command Post (NEACP) aircraft are standing by. These E-4 aircraft (highly modified 747s) are equipped with extensive C³I facilities and the personnel to man them. The NEACP is highly susceptible to blast damage while on the ground, of course, and Andrews, too, is within ten-minute range of Soviet submarines.

Once airborne, the E-4, particularly the E-4B which is hardened against electromagnetic pulse effects, is highly survivable. As with bombers, the NEACP is limited to about seventy-two hours of continuous airborne operation.¹³ Its problems of longer term survival are almost identical to those of the strategic bomber. Suitable runways, support equipment (fuel, spare parts, food), and personnel (ground and air crews) must all somehow endure to support the NEACP operation.

Returning now to the first aspect of the command problem, the question of who is in charge of the war may be difficult to answer as the war progresses. If the President is killed, incapacitated, or separated from the C³I system, continuity of the Presidency, along with its concomitant command authority, is essential. The devolution of the Presidency (with all it implies in terms of support equipment and support staff), including the authorized transfer of war control down a prescribed chain, must be a part of long-war planning.

Plans for continuity of government and protection of the surviving commander ought to be designed to ensure some minimal capability, even under the worst circumstances. That is, planners ought to guarantee that some minimum essential control for nuclear forces can be assured under even the extreme demands a sustained general war will impose on the Presidency. With what level of confidence can the President or his designated successor be protected in the event, for example, of a surprise attack at 4:00 a.m. on Christmas morning? What if the President is abroad? What if the weather will not permit helicopter flight from the White House to Andrews? What if trained saboteurs attack NEACP on the ground before launch? Protection of the National Command Authority must provide for continuing control of nuclear forces under a variety of the worst imaginable conditions.

POLICY OBSTACLES

The US concept of deterrence rests on the idea of a punitive retaliation, a single devastating blow that threatens to destroy those targets the Soviets value most. This historical

mind-set of punitive deterrence is reflected in the way nuclear force planning has evolved. Because the retaliation must punish, it should be massive to ensure its credibility. The war need not be fought at all if it can be deterred. As in the past, current nuclear force planning supports current policies by ensuring that forces are postured for a credible retaliatory strike. New policy must overcome historical reluctance to look beyond the consequences of failed deterrence.

Historical Inertia

Public attitudes have also helped shape policy. In chapter 2, I noted nuclear war's social unacceptability as a topic of polite conversation. Beyond the natural aversion to an unpleasant subject, the idea that thinking about nuclear war might somehow make it more likely to happen is a prevalent attitude. Because serious planning for warfighting somehow implies a lack of faith in the adequacy of deterrence in the first instance, the subject is reluctantly broached.

Other historical obstacles confronting new policy have to do with this Nation's traditionally ethnocentric view of international matters, including war planning. Some of the consequences of US ethnocentricity have already been noted, but it is worthwhile here to summarize its impact on attempts to formulate policy changes.

For convenience, this Nation traditionally compartmentalizes nuclear systems and arbitrarily defines strategic systems as those with intercontinental, homeland-to-homeland range. Because the Soviets seem not to share this view, this different perspective may lead the Soviets to underestimate US forces, plans, and posture—and not be deterred. With the advent of strategic parity or rough equivalence between US and Soviet strategic forces, any mismatch between intent and perception creates extra risks. In any case, the US nation-centered approach to matters of state has shaped, and very likely will continue to shape, our precepts and approaches to nuclear war. The revised strategic warfighting doctrine, inasmuch as it attempts to align our deterrence more closely with the Soviet

view, will have to overcome the subtle forms of resistance caused by historical inertia.

A final policy obstacle concerns the SIOF and its historical legacy. The SIOF has evolved in support of changing national strategy in a symbiotic relationship. From its inception in 1960 as a vehicle to integrate nuclear strike plans, the SIOF has been the responsive implementer of national doctrine. Linked through the NSDM/PD-NUWEP-SIOF process described earlier, the SIOF has faithfully implemented the deterrent philosophy. The need for more flexibility was accommodated.¹⁴

Disconnects among Policies

Examination of the various kinds of policies associated with nuclear warfare gives some impression of the general lack of integration among these policies. Indeed, integration is a problem that will hinder attempts to create and implement useful new policies.

Inadequate policy integration has been a long-recognized national problem. President Carter's Presidential Review Memorandum 10 ordered a complete review of US nuclear employment policy inherited from his predecessors in NSDM-242. This review revalidated NSDM-242 guidance but called for additional studies of employment and targeting policies, in part to ensure proper integration with other nuclear policies. A great deal of the rationale for the original development of NSDM-242 was the perceived need to integrate US nuclear policies. Every administration for the last decade has felt the need to reexamine the policy aspects of US deterrence.

The Reagan administration reenunciated US strategy in May 1982. Acting as an administration spokesman, National Security Advisory William P. Clark noted that the President had directed a review of the departmental policies which comprise national security strategy, "to make sure our various policies were consistent." This review is said to have specifically included "the targeting doctrine that had its origin in PD-59."¹⁵

There are several reasons why policies are not consistent. One reason is that some policies—procurement policy, for example—deal with broad areas which include nuclear matters as a subset. Declaratory and arms control policies also reflect this generalized approach although not to the extent that procurement policy does.

Time is another problem. New policies are not implemented overnight. The time between the announcement of a new policy and its implementation may take years, a normal consequence of both the bureaucratic staffing process and the long acquisition time for new forces. Time lag is an important contributing factor to the inconsistencies among various nuclear policies.

Another reason for policy inconsistencies, the rationale for the development of each kind of policy differs, as policies quite naturally serve different purposes. Procurement policies reflect fiscal pressures as well as economic and political considerations. Procurement of a thousand Minuteman missiles or a hundred B-1 bombers is a triumph over fiscal pressures which overshadow employment policy requirements rather than a response to those requirements. Arms control policies, which seek accommodation and agreement on difficult issues, may influence weapons procurement or employment policies. An agreement to restrict the range of an air-launched cruise missile will affect its design and, thereby, its procurement. Limiting bombers to twenty cruise missiles each obviously affects employment policy.

Declaratory policy is meant to serve deterrence, and may not necessarily be driven by efficiency or practicality in the way weapons are used. Declaratory policy embodied in PD-59, for example, directs the selective targeting of military targets. However, in the employment process, the number, hardness, location, or proximity to civilian population centers of some specific targets may preclude them from coming under attack as envisioned by declaratory policy. Some expert

observers assert that declaratory policy rarely coincides with the realities of targeting practice, so different motivations for policies will also act centrifugally against attempts to integrate policies into a coherent whole.¹⁶

A few simple things also cause divergence in nuclear policies. Different policies are formulated at different times. Circumstances change, factors vary in their importance, and new administrations see problems and place emphases differently. An employment policy developed under the Nixon administration (NSDM-242), an arms control policy developed under the Carter administration (PD-50), and a declaratory policy penned by the Reagan administration (warfighting strategy), not surprisingly, are not totally consistent.

Each policy's purpose determines which agency is responsible for policy development. President Reagan's five-point program to modernize strategic forces, for example, contained important declaratory policy. The Arms Control and Disarmament Agency is primarily responsible for arms control policy and produced, for example, PD-50, specific policy on arms control. The Office of Management and Budget, because it acts as the executive branch's watchdog for Federal budget expenditures, oversees national procurement policy. Employment policy, the NUWEP, falls principally into the domain of the Department of Defense. So policies emerge from many sources, but the Secretary of Defense is responsible for declaratory, employment, and acquisition policy and coordinates with other agencies on arms control, civil defense, and general continuity of policy.

Still, each agency has its own distinctive approach to policy development, which it protects and defends. Perhaps the most compelling cause of potential policy inconsistencies is the lack of a single permanent agency with overarching responsibility to ensure the integration and coherence of national nuclear policies.

There are also good reasons why policies do not always agree. Declaratory policy can be used to convey a warning or clarify intent, but force posturing may not necessarily corre-

spond. We may, for example, declare that if attacked we will launch ICBMs while under attack, so this declaration of intent will reinforce the credibility of a retaliatory strike. ICBM employment planning, however, may still figure on not primarily using ICBMs until after riding out the attack. Some such policy inconsistencies may benefit us by confusing, and thereby deterring, the Soviets. Even so, inconsistencies among policies should be deliberate, the result of rational planning—not happenstance.

The many policies which comprise nuclear policy should complement each other. Collectively they should synergistically contribute to national security. Procurement, arms control, and employment policies are alternative means of mitigating the same problem or "stress." Our bomber vulnerability to attack by Soviet submarine-based missiles, for example, could be lessened in any one of several complementary ways. We could negotiate submarine "keep-out" zones sufficiently far from the coasts to decrease the danger (arms control policy). We could design a new bomber with fast-escape, short-takeoff characteristics (procurement policy). Or, we could move present bombers further inland to allow more reaction time (deployment policy). Negotiating away the keep-out zones, for example, should be done only in full concert with offsetting actions in other policy areas.

The need for harmony among policies and the need to close the gap between stated policy and force capability are clear. The force of history, combined with the way policies are developed and implemented, will make complete policy integration a challenging task. The requirement to implement a warfighting multiple-exchange strategy presents an opportunity to overcome the several policy obstacles which lie in the path of progress. Acknowledging the task is the first step.

Given both an understanding of the force and policy problems and the obstacles they present, we can now deal with our strategic dilemma—the strategy, force, and policy mismatch. The next chapter will suggest approaches toward useful solutions.

4. RESOLVING THE MISMATCH

Solutions to problems posed by warfighting strategy for a long war are theoretically straightforward. Strategic forces must be endowed with flexibility and enduring survivability, and nuclear-related policies must be made coherent. For strategic forces and their direct support, this will mean rectifying present systems and designing required attributes into future systems. Remedies in policy will require us to (a) create a process to reconcile and integrate disparate policies, (b) create a policy-planning function to establish and maintain adequate policies, and (c) tailor plans to match available forces with the warfighting requirement of a long war.

Implementation of these straightforward solutions will be much more difficult in practice than in theory. To provide a logical approach for consideration of specific correctives, I will address the obstacles (discussed in chapter 3) and suggest responses to each.

APPROACHES TO OVERCOMING WEAPON SYSTEM LIMITATIONS

Each strategic weapon system is deficient in one or more characteristics needed to survive and fight a long war. These differences vary from system to system, but by judicious attention to planning, it is possible to exploit the advantages of each system and compensate for weaknesses.

For example, the excellent survivability of submarines provides a useful pool of weapons for a multiple-exchange war. Enhanced by improved communications and greater accuracy, submarine-based missiles could serve an important role for follow-on nuclear strikes. If survivability can be increased, the excellent communications and high accuracies available in land-based missiles, together with their inherent targeting flexibility, provide an opportunity for retargeting *during* the war against a variety of targets, including hardened counterforce targets. The exceptional flexibility of bombers, provided they are able to penetrate Soviet defenses, permits their use against mobile or previously unlocated targets, or against widely separated or isolated targets.

Recognizing the New Criteria

Although compensating for weaknesses in each weapon system is useful, weaknesses should be corrected. Almost all current force inadequacies can be eliminated by judicious application of enough money. Our ICBM survivability can be purchased by deceptive basing, a ballistic missile defense system, or a combination of the two. Two-way communications by bombers and submarines can be attained without giving away the crafts' positions by installation of the right kind of radio and data-transmission equipment. Improving the accuracy of submarine-based missiles, primarily through better guidance systems—the D-5/Trident II system for example—will permit submarine-launched missiles to attack more targets, including hardened targets. With proper equipment such as sophisticated radars, bombers can be configured to seek out and attack targets of opportunity. The point is that weaknesses can be overcome. First they must be understood; then remedies must be developed and funded.

For future weapon systems, design specifications need to include those criteria necessary to support the multiple-exchange war—endurance, survivability, sustainability, and flexibility. Specific criteria for each weapon will come out of a careful matching of weapons characteristics to the requirements of new employment policy. Force planners must ensure

that strategic systems already designed but not yet in the inventory, the B-1 and the MX, meet as many of the "new strategy" criteria as possible, even delaying initial delivery in order to incorporate short-term fixes. The B-1 bomber, for example, should incorporate the technology to seek and destroy targets of opportunity.

Adjusting Force Postures

The way forces are configured for a short war is not ideal for a long war. Currently, bombers and submarines not on alert are vulnerable in some circumstances to surprise attack. In a multiple-exchange war, protection of nonalert forces becomes important, even to preserve means and weapons for follow-on nuclear strikes. One of two obvious solutions will provide more surviving delivery systems and weapons: either increase the percentage of forces on alert or protect the weapon systems not on alert. The latter can be done by dispersing nonalert craft and weapons, storing them in hardened facilities, or providing them with a means to escape on receipt of tactical warning.

Another aspect of current force posture that needs revision is the low percentage of strategic forces assigned to the reserve role. Even if nonalert units can sortie on attack warning, a multiple-exchange war will require more weapons and delivery systems than these nonalert survivors can provide to support follow-on strikes.

Prudent planning may necessitate that some weapons be taken out of the first-exchange role and assigned to follow-on exchanges. In fact, success in a multiple-exchange may well depend more on weapons available *after* the first exchange than those available for the first retaliatory strike. This role reversal in the importance of reserve versus first-exchange weapons is an important difference between a single massive retaliation and a multiple-exchange warfighting posture.

Providing for Survival and Endurance

Enduring survival for US bombers in a long nuclear war depends on the availability of bases and support facilities.

Since SAC bases are likely to come under attack early in a multiple-exchange war, the continuing survivability of base-support facilities is highly doubtful. There are (as I discussed in chapter 3) a number of suitable runways at other commercial locations. However, even if these non-SAC facilities survive, remaining strategic bombers will need fuel, service, spare parts, new crews, bombs and munitions, and flight materials.

Although US bombers could land on suitable runways in other countries, reloading with nuclear weapons and sensitive flight materials is a matter best accomplished on sovereign US territory, particularly in a general war which includes both the United States and its allies. Even if other runways able to handle a B-52 were added to those in the United States, prospects for the enduring survival of US bombers would not improve appreciably.

Two basic approaches to enhancing bomber survivability will provide considerable improvement over current prospects: facility dispersal and facility hardening. One illustrative concept for dispersal would involve mobile service and repair centers, with fuel, crews, bombs, and spare parts. These mobile centers, perhaps consisting of one or more large trucks, would survive by dispersing and would subsequently move to a surviving runway to service strategic aircraft.

The mobile repair and service approach could work together with a technique used by Germany in World War II—converting highways to runways. With adequate planning, suitable stretches of US interstate highways could be used (reinforced if necessary) as wartime runways. Some support items could also be pre-positioned in hardened shelters as a part of this concept.

Hardening base-support assets, including equipment to repair battle damage, is a second approach to endurance. A survivable runway repair capability is certainly feasible. Road construction equipment, such as bulldozers and graders normally assigned to the base civil engineer, could be made considerably more survivable if protected in nearby underground

shelters. If the radiation levels are acceptable, this construction equipment, together with hole-filling or hole-bridging materials also protected from attack, could provide the means to repair damaged runways rapidly. Deeply buried weapons, spare parts, and fuel would allow continuing support. Because of the potential for high radiation levels in a postattack environment, crew and service personnel may have to rely on dispersal rather than sheltering at each base.

The same kinds of techniques are applicable to submarines. Hardened shore facilities for refitting and reprovisioning could provide staying power for missile-firing submarines. As an alternative, at-sea reprovisioning, using specially configured ships or submarines, should also be feasible.

Improving Logistics Survivability

Sustainability in a long war will depend on continuing logistics support. For peacetime economy and efficiency the logistics support for the Air Force's major weapon systems has been centralized into large supply and repair depots, the ALCs. The Ogden ALC, Utah, serves as the depot for Minuteman and Titan II missiles. The Oklahoma City ALC provides similar support for B-52s, as does Sacramento ALC for FB-111s. The San Antonio ALC handles nuclear ordnance, and Warner-Robins ALC, Georgia, is responsible for consolidated supply and repair of weapon fire-control systems, airborne communications and radars, and electronic warfare systems. One other facility, Newark Air Force Station, Ohio, is the single center for repair of strategic missile guidance sets. These unprotected logistics centers provide inviting targets for early destruction, and their loss would virtually eliminate continuing logistics support for land-based missiles and bombers.

Dispersal offers the best solution for protecting a logistics support base. Rather than concentrate all spare parts in a single location, predetermined dispersal points should be provisioned with those spare parts which will be most needed after the war starts. Dispersal of men and machinery necessary for a continuing capability to repair weapon systems also

seems prudent. Some hardening might also be appropriate at selected depot facilities to protect heavy machinery needed for specialized repairs.

Enhancing Reconstruction and Recovery Procedures

Each SAC base currently has a plan for the repair and reuse of bombers and launch missiles which survive a nuclear exchange. Unfortunately, the "recovery and reconstruction" plans, as they are called, are superficial and inadequate for useful support of a warfighting strategy. As Colin Gray points out in his article on the efficacy of PD-59, "The fact is that to this day US strategic forces lack endurance, *and lack serious support and plans for post-strike reconstitution* [emphasis added]."¹

During a war, the weapons returned to the usable inventory by repairing and reloading are too valuable a resource to waste through insufficient planning. Serious planning, together with initiatives to protect personnel, spare parts, and repair equipment, is essential because of the importance of reconstitution in generating weapons for follow-on strikes in a long war. To be credible, this planning should at least address the following:

1. *Specific bomber recovery procedures.* Plans should provide a detailed, preplanned process for the flight routes, refueling tanker assignments, landing locations, reload and reprovisioning procedures, assignment of replacement crews, and follow-on strike plans.

2. *Specific tanker recovery procedures.* Planning for the turnaround of tanker aircraft should be as complete as that for bombers, and include specific follow-on refueling assignments.

3. *Land-based missile damage repair.* Detailed plans should include physical protection for missile-recovery convoy personnel, in off-base hardened shelters, for example; pre-

positioning of spare parts and equipment at dispersed hardened locations; and procedures for reload of missiles.

4. Reload of land-based missiles. Present land-based missile silos are designed for the one-time launch of a single missile. When the missile's first stage is ignited within the silo, the resulting blast, heat, and acoustical vibration cause extensive damage to the inside of the launcher. At Vandenberg Air Force Base, where test launches are repeatedly conducted from the same location, several modifications that protect the facility allow reuse with only a moderate amount of refurbishment.

The newer MX missile will be designed with a "canisterized" cold launch system; that is, the missile is encased within its own container which is emplaced in the silo. The missile is ejected from the canister, which stays in the silo, by a gas generator inside of the canister. The missile's first-stage engines are ignited *after* the missile leaves the silo and the canister. This type of launch system causes negligible damage to the silo.

To support a multiple-exchange war, Minuteman silos should be modified to correspond to those at Vandenberg Air Force Base, for rapid refurbishment, reloading, and refiring. If Minuteman silos are modified to accept MX missiles, a reload and refire capability should be designed in.

Either configuration should include protected spare missiles, nearby or conveniently accessible, together with survivable loading equipment and surviving personnel. Plans need to provide for practice, training, and targets for reloaded sorties. Reloading missiles is a logical way to multiply the capability of remaining missile silos and to add many additional hard-target-capable weapons to the continued prosecution of a multiple-exchange war.

5. Deployment of a long-war ICBM. A longer term solution to provide follow-on ICBMs for a multiple-exchange war is to design and field a small, highly mobile ICBM somewhat similar to the Soviet SS-20 IRBM. If the cost, public resist-

ance, and environmental problems can be overcome, a truly mobile single-warhead ICBM is ideal for a long war. Its mobility allows it to survive. The single warhead and good accuracy provide flexibility to attack isolated targets, including hardened targets, with minimum damage to nearby areas.

6. *Reloading and reprovisioning of submarines.* With reloading, submarines could also add to the pool of weapons available for a long war. At-sea provisioning will require specially configured submarine tenders that are loaded with spare missiles and are dispersed to submarine patrol areas. Hardened coastal submarine pens could also reprovision missile crews with food and weapons. As with land-based missiles, reloading and reprovisioning of submarines is a logical force multiplier in the context of a multiple-exchange war. Submarine recovery and reconstitution plans must include specific targets and patrol area assignments.

APPROACHES TO OVERHAULING COMMAND AND CONTROL

Because this Nation depends on a centralized authority for control of nuclear weapons and nuclear war, weaknesses in the command system which decrease its chances of surviving and functioning in a long war must be remedied. The topic divides into two subject areas: the C³I system and the NCA.

C³I Initiatives

One hopeful sign, the current C³I system's problems are no longer hidden. National leaders are willing to discuss the subject openly and (what is more important) aggressively pursue remedies. In fact, President Reagan has made C³I modernization a centerpiece of his strategic modernization program. He noted in announcing his five-point program in October of 1981 that improving communications and control systems that are "vital" to strategic forces "is as important as any other decision" in the modernization package.²

Secretary Weinberger has reinforced the importance of C³I modernization. In his words: "An underlying and vital part of the strategic modernization program is the absolute necessity to improve significantly our communications and control system."³ The particulars of his program are impressive.⁴ For assessing a strategic attack they include these directions:

1. Upgrade conventional attack warning systems, upgrade the survivability of attack warning satellites, and deploy several mobile ground terminals to back up satellite data-processing capability.

2. Improve satellite and ground-based warning systems.

3. Add new surveillance radars to the Southeast and Southwest to cover potential submarine operating areas.

Other initiatives are designed to "upgrade the capability and survivability of command and control."⁵

1. Deploy E-4B airborne command posts to serve the NCA in time of war.

2. Harden existing EC-135 airborne command posts against nuclear effects and enhance EC-135 ability to communicate with both the NCA and strategic forces.

3. Develop a new satellite communications system employing extremely high frequency channels for Presidential communications.

4. Install low-frequency and very low frequency receivers on bombers.

5. Provide deployed submarines with an upgraded communications package.

6. Initiate a "vigorous R&D program leading to a command and control system which will endure for an extended period beyond any initial attack."

Another hopeful sign that this administration means what it says is its recent decision that C³I would now and in the future enjoy a priority for resources at least equal to that of the

high-visibility weapon systems. Current plans call for 18 billion in fiscal year 1982 dollars to be spent on strategic C³ alone over the next six years.⁶

If emphasis on the problem continues and is supported by necessary funding, C³I is one area which should improve dramatically. For the future this commitment must be backed up by realistic planning that adjusts to accommodate improvements as they occur. Realistic exercises, involving the NCA if possible, can provide confidence that the system will work as intended in time of crisis. Current national policy includes PD-58, "Continuity of Government/C³I," and PD-53, "National Security Telecommunications Policy." Finally, national policy which deals with C³I should be reviewed regularly to ensure both that it is adequate for the long war and that its guidance reflects the current status of improving C³I systems.

Providing For NCA Survival

The extensive initiatives above will do a great deal for C³I hardware. Equal vigor must be devoted to ensuring that an NCA survives to use the system. The concept of a few hardened command centers served us well in the 1960s and early 1970s when the Soviets lacked weapons with sufficient accuracy to threaten hardened targets. Soviet capability for the 1980s differs markedly. About two-thirds of the total Soviet warhead inventory are deployed on Soviet ICBMs. This provides the Soviets with more than four thousand warheads accurate enough to cause a high probability of severe damage to US ICBM silos with a single shot. This threat can mean the early destruction of the Pentagon, White House, Fort Ritchie, Cheyenne Mountain, and SAC Headquarters if the Soviets choose to invest their resources in the attack. Given that theoretical possibility, the best hope for assuring the NCA's survival may lie in mobility.

If the NCA can successfully escape in an E-4B command aircraft (NEACP), the C³I system will have a head, at least until the aircraft has to land. As mentioned earlier, continuing

survivability demands realistic procedures for landing and refurbishing.

An alternative approach to increase the chances for prolonged survival of the NCA would involve mobility on the ground rather than in the air. A number of ground-transportable command centers, perhaps configured as trucks or truck-trailers, could be dispersed and moved randomly. Their redundancy would provide safety, and their mobility would enhance survivability.

One necessity of command is eliminating ambiguity about "who's in charge" throughout the war. The process of passing the command of nuclear forces down from the President to each succeeding commander (who then becomes the NCA) is called "devolution of command." Command of nuclear forces is an inherent part of the President's Commander in Chief responsibilities. Thus, protecting the Presidency during a war and providing for orderly succession if the President is killed or incapacitated will automatically ensure the devolution of NCA responsibility. DOD Directive 5100.30, dated 2 December 1971, defines national command authorities as only "the President and the Secretary of Defense or their duly deputized alternates or successors," which implies a latitude to delegate NCA responsibilities to a "duly deputized alternate."

A long war may require several successive NCAs, each with clear knowledge of NCA responsibilities, including when to take over and how to exercise command. The C³I system, in turn, requires clear precoordinated procedures about who is and who will be in charge and to whom anyone should respond at any given stage of the war. Let us hope that today's closely held procedures are adequate. Whatever the scheme for survival of the NCA and devolution of command, adequate planning and practice are important to make sure the system will work when needed.

"Civil Defense" for the Military

The vulnerability to nuclear attack of the very military personnel and equipment most needed to sustain a long-war ef-

fort is obvious. One solution to this vulnerability would be some version of "civil defense" for military personnel. Hardened, dispersed shelters, together with protected equipment needed for dig-out and repair, would do much to keep alive and fit the military forces needed to continue the war. Prudent planning for the multiple-exchange war should include this neglected aspect of the long-war strategy.

RECONCILING DISPARATE POLICIES

Once the forces, including support equipment and people, are adequate for the demands of the long-war strategy, they must be supported by workable plans derived from coherent policies. There are different ways in which policies and implementing plans can be improved to match forces with the "new strategy."

Out with the SIOP and In with a New Concept

The SIOP has served this Nation well. For more than two decades it has implemented deterrence through the careful matching of weapons to targets. The credibility of the SIOP or its efficacy as the ultimate guarantor of a nation's will to preserve the peace through strength by threat of a sure, strong retaliation has proven itself. Although severely strained, the SIOP has met the demands for more and more flexibility. With the advent of the "new strategy," a long-war warfighting strategy, it may be time to retire the SIOP approach, an approach married originally to the strategy of a single-strike short nuclear war. It may be time for conceptual leaps, to accommodate realistically the many demands of the "new strategy." For the sake of discussion, let's define a new employment document and call it the Warfighting Integrated Operational Plan, or WIOP, to distinguish it from today's SIOP.

The WIOP should be the implementer of the "new strategy" and should contain elements that directly support warfighting over a long war. The WIOP should allow multiple

strikes, with careful attention to forces used beyond the initial exchange, and it should accommodate today's demands for more flexibility with sufficient room for future expansion. Specifically, the WIOP should accomplish the following:

1. Ensure that deterrence is served by complicating Soviet attack planning, thereby increasing enemy uncertainty. The fundamental objective of the "new strategy" has been to enhance deterrence, primarily by playing more directly to Soviet perceptions of a credible force posture. A warfighting strategy, with sufficient forces and believable planning, can pose for the Soviets serious questions about their ability to achieve a favorable outcome in any type of nuclear war. To the extent that doubt and uncertainty in the Soviet mind result from a credible warfighting strategy, US deterrence is enhanced.

2. Plan for multiple strikes. Such planning should include detailed use of reserve and reconstituted weapons, as well as plans for dispersal and protection of weapons and support systems.

3. Reverse the importance of and the number of weapons committed to the first retaliatory strike versus those weapons assigned to subsequent strikes. The WIOP must allocate sufficient forces to follow-on strikes to build up their feasibility and credibility. This allocation recognizes the necessity for continuing dominance of the war throughout a multiple-exchange war, the need for credible strikes to continue escalation control, and the need for sufficient weapons to deny the enemy a dominant reserve force. Of course, the WIOP must also be sufficiently flexible to accommodate the old single massive retaliatory strike.

4. Allow for transattack and postattack targeting options. A long war certainly requires a flexible, adaptive command system which can tailor succeeding strikes to the demands of unfolding events. A totally preplanned and nonadaptive system will be inadequate.

5. *Develop planning to accommodate targets of opportunity, mobile targets, and other unfixed or initially not located targets.* The "new strategy" will depend on attacking targets that develop as the war progresses. All strategic systems have the capability for retargeting *during* the war, and as new targets are located, the WIOP must allow for attacking them. Transattack targeting will also allow attacks on mobile targets; denial or Soviet efforts to relocate troops and weapons could be significant in a long war.

6. *Integrate the inherent capability of strategic bombers to seek and destroy targets of opportunity.* By exploiting the ability of manned bombers to perform on-the-spot reconnaissance, the WIOP can utilize a significant US advantage.

7. *Plan for procedures to obtain and utilize information on the status of both US weapons and Soviet weapons.* Such data will be essential for attack planning, escalation control, and negotiations.

8. *Integrate all nuclear weapons systems, including theater and tactical ones, into planning for war prosecution.* A warfighting strategy must view war as a continuum and all nuclear weapons as part of the warfighting arsenal. Exempting theater and regional nuclear weapons from strategic war plans constitutes an arbitrary handicap on the calculus of weapons available for warfighting.

Collectively, these new capabilities argue for a fresh approach, a new vehicle to implement the greatly increased demands of a warfighting strategy for a long war.

Integration and Orchestration of Policies

In addition to upgrading employment policy, *all* nuclear policies should be reviewed and integrated. A review process is necessary to ensure that policies support the "new strategy"; integration is necessary to ensure that policies support one another.

To make policies coherent, the National Security Council must develop a directive *requiring* coherence among weapons

employment, declaratory policies, arms control policies, and procurement policies. A Presidential directive (PD) or national security decision directive (NSDD), the Reagan administration's equivalent of the NSDM, would serve as the proper vehicle for such guidance. The PD or NSDD should require an initial review and specify procedures for the functional integration of nuclear policies in support of national strategy. The goal of this review and integration process should be to ensure that all policies are viewed as complementary, alternative, or integrated approaches—pieces of a whole.

Establishing a Policy Planning and Overview Function

Once Presidential-level guidance establishes the requirement for policy review and integration, the process will require a "home," and an agency responsible for oversight. The President should establish a policy planning and overview function, either within the National Security Council or within the office of the President's National Security Adviser. This function (agency, staff, office, or director) should:

1. Review nuclear policies for coherence.
2. Provide planning and coordination for future policy changes.
3. Develop and maintain an updated statement of fundamental national security interests.
4. Ensure that all nuclear policy is clearly derived from national security interests.
5. Oversee the evolution of current plans and policies into those which support a warfighting strategy for a long war (e.g., the transition from SIOP to WIOP).
6. Develop a useful nuclear warfare measurement system which works practicably with Soviet perceptions of measurement systems and is standardized for wide acceptance.

Once both the requirement for coherent policy and the structure to manage the integration process are established,

our strategic ailments may begin to heal. The process will be neither easy nor rapid. To assume that it will be as easy to implement prescriptions for remedies to policy inconsistencies as it is to diagnose policy problems is naive. A credible warfighting strategy requires remedial pressure on both sides of the problem to narrow the gap between strategic forces and policy implementation. In short, we must tailor forces to match declared strategy and move policy toward a coherent vision and way to implement the "new strategy."

NOT WITHOUT SUSTAINED COMMITMENT

As a prelude to some thoughts on aligning strategy with forces and policy, let us assume that the progenitor of our strategic dilemma, the warfighting strategy for a long war, is here to stay.

What ought to propel our desire to seek solutions is an appreciation of both the permanence and the magnitude of the basic shift in strategy represented by PD-59 and Reagan administration pronouncements. The shift, though evolutionary in concept, is revolutionary in its impact on forces and strategy. Old approaches may simply no longer be adequate to the new tasks.

Critics will argue that a long war is improbable. Its likelihood is not at issue. It is futile to argue over whether one believes in a multiple-exchange war. Reality is the unequivocal declaration of a warfighting strategy. Given this declaration, responsible nuclear strategists are *required* to plan for a multiple-exchange war. The task at hand, then, is to begin implementing reforms in an orderly, efficient manner.

Logically, solutions are composed of both near-term and longer term parts. Some policy repairs—a review of current policies, for example—can be started immediately with expectations of payoff within months, whereas a newly established policy agency may take years to complete all of its required policy-integration tasks. Some modifications to current strategic weapons can be implemented quickly. Redesigned ra-

dios on B-52s, for example, will provide greatly improved two-way C³ for the near term. For future weapon systems, the criteria of endurance, survivability, sustainability, and flexibility must be translated into specific design requirements now so that new systems will support the "new strategy." The impetus of those changes already begun must be preserved. An enduring and capable C³I system will require a continuing national commitment with high priority and adequate funding.

Because many of the remedies will take several years, their implementation will require patience, perseverance, and dollars. The unequivocal capability of US forces to support a long-war strategy adequately must await the completion of modifications to current weapons and the acquisition of more serviceable systems to follow. New systems are rarely designed, developed, and deployed in less than seven to ten years. President Reagan's initiatives to strengthen the ability of the US economy to mobilize for war will take at least that long. In sum, a warfighting force for a long war, with adequate implementing policies, is attainable but not without a sustained national commitment of at least ten years.

SUMMARY

My purpose throughout this paper has been to provide a useful framework for examining an important problem—the disturbing gulf between declared nuclear strategy, and coherent policies and capable forces. Because the problem is complex, addressing it requires an ordered construct which gathers all relevant aspects and lays them out in proper relationship to one another. This ordered view itself is as valuable as suggested specific solutions in imparting an appreciation of the scope of the problem and the many decisions necessary and relevant to its solution.

Some simple truths emerge. The problem caused by the mismatch between current capability and declaratory strategy is real, is complex, and is not amenable to easy solutions or quick remedies. Realistically, its solution will require money,

time, and sustained effort. Since the credibility of this Nation's strategic deterrent posture is at stake, the United States must act with dispatch and seriousness.

Strategic weapons and their support systems must all be enhanced. The new demands on strategic weapons will mean additional costs for both present and future weapon systems. Significant shortcomings must be redressed with regard to C³I systems and NCA survival and control procedures. New force characteristics—endurance, survivability, sustainability, and flexibility—become guiding virtues.

Policies and their implementing plans are in need of serious attention. New conceptual leaps are in order for weapons employment plans—the SIOP approach may no longer be adequate. All US nuclear policies should be carefully examined for coherence, consistency, and relevance, and institutions and procedures should be created to ensure continuing policy integration.

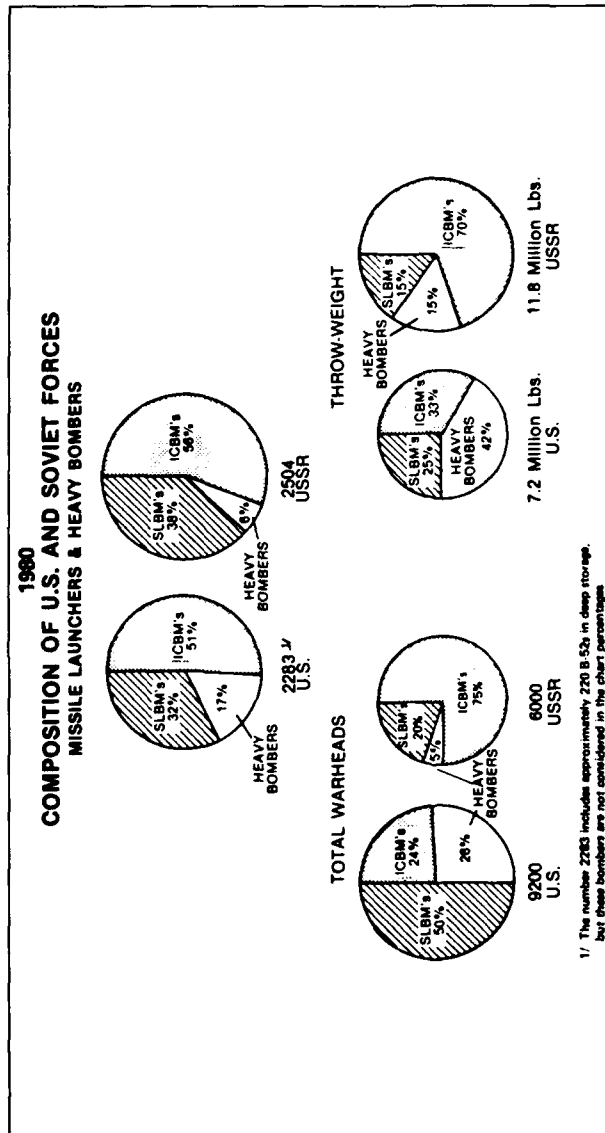
Given all of the above, this Nation may indeed benefit from a major increase in the credibility of nuclear deterrence through its warfighting strategy, with a multiple-exchange capability to back it up.

APPENDIX

MEASURING THE OUTCOMES OF NUCLEAR WAR

The simple concepts of victory and defeat are inadequate to describe the consequences of a nuclear war. Nonetheless, because military planners and strategists must assess the effectiveness of nuclear forces and nuclear war plans, strategic analysts have developed several different kinds of effectiveness measures. No one such measurement is perfect or best; each is useful to describe some characteristic of nuclear weapons or some aspect of nuclear war.

Measures are usually described as belonging to one of three groups, according to the complexity of the measure. The first group contains measures, such as shown in figure A-1, called "static" measures and usually referred to as static MOEs (measures of effectiveness). This category describes obvious physical traits—how many, how heavy, how big—and is useful for simple comparisons. Static MOEs describe the *characteristics* of a system. Using static MOEs, we can describe a bomber force as having two hundred bombers, each carrying ten bombs of one-megaton yield, each bomber able to fly three thousand miles without refueling. This kind of information is particularly useful for arms control discussions, as the objective is usually to control the numbers of weapons. However, to get at the *utility* of a given set of weapons, we must go beyond static measures because they can only hint at how well an arsenal performs.



Source: US, Department of Defense, *Annual Report, Fiscal Year 1981* (Washington, DC: Government Printing Office, 1979), p. 89, chart 5-6.

Figure A-1. Example of Static Measure Use.

The most complex measurements, "dynamic" MOEs, seek to describe how well nuclear weapons perform their intended tasks. A dynamic MOE typically begins with an arsenal of specified static characteristics and applies this arsenal dynamically to a specified set of targets (that is, it hypothetically attacks the targets with a given arsenal). The aggregated results constitute the measure. Here things get complicated, and involve a great many assumptions about weapons performance, target vulnerabilities, and attack scenarios. Dynamic MOEs can be made elegantly simple in their final form. However, the inherent complexity in nuclear warfare calculations may restrict the useful application of dynamic MOEs to dialogue between strategic analysts.

In terms of complexity, there is a third, middle group of measurements. Because they are somewhat similar to dynamic MOE's, strategic analysts call this group "quasi-dynamic." They involve some mathematical manipulation on static MOEs to aid comparisons. *Equivalent megatons*, for example, a commonly used quasidynamic MOE, compare weapons of various yields to an equivalent number of one-megaton weapons. *Hard target kill*, another common measure, results from applying weapons iteratively to a specified hard target and summing the results. Quasidynamic measures attempt to get at the potential utility of a given set of weapons without actually gauging them against targets as dynamic measures do.

Aided by this overview of the types of MOEs, we can now move from computing the strategic balance by aggregating static measures to an examination of some of the more important types of strategic measures derived from dynamic analyses. In surveying these measures, the purpose is twofold: first, to gain insights into how nuclear warfare is currently assessed and, second, to appreciate the complexity and diversity inherent in the measurement process.

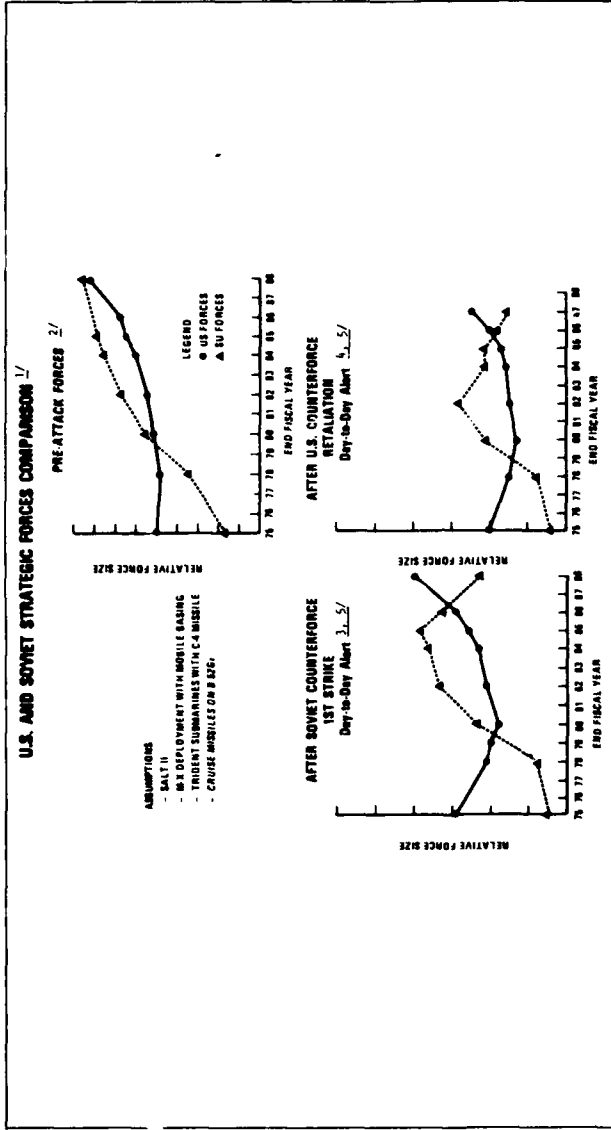
Our approaches to evaluating the outcomes of nuclear war are based primarily on the statistical concept of expected value. This approach asks, "If the same war were fought many times, what outcome could we expect to occur most fre-

quently?" Measurements of missile accuracy, for example, are specified as a radius which describes a circle into which a warhead is expected to impact 50 percent of the time. The measure is called the 50 percent circular error probable, or 50 percent CEP. The statistical approach using expected value is an important underpinning for dynamic analyses. As noted in chapter 3, the US approach is in obvious contrast with the way the Soviets tackle the same problem.

One of the more influential forms of dynamic analysis has been that used by the Defense Department in guidance and policy documents, such as *Defense Guidance* and the *Annual Report to Congress*. The methodology and its dynamic MOE for relative force size (RFS) were developed by the Office of Programs Analysis and Evaluation to provide a standard comparison for dissimilar arsenals. An example of a relative force size comparison between US and Soviet arsenals, extracted from the *Department of Defense Annual Report for Fiscal Year 1980*, is shown in figure A-2.

The simple appearance of the results is deceptive. Relative force size is actually a complex measure which must be thoroughly understood and carefully interpreted. The measure starts with an arsenal, a target base, and a specified set of damage goals. The arsenal is applied to the target base, usually Soviet nonsilo military and economic targets, to determine what fraction of the force exactly achieves the damage goals, usually specified as a percent of military targets destroyed and a given amount of economic value damage. The inverse of this function is plotted as RFS. An RFS of 2, for example, means that the arsenal can exactly achieve the damage goals with one-half of its forces. Because the measure is difficult to interpret, it was subsequently modified and called retaliatory potential, and then dropped altogether in favor of simpler measures.

The dynamic methodology used by the Joint Chiefs of Staff was developed to be similar to the Department of Defense's RFS approach. The measure is called discretionary



Source: US, Department of Defense, *Annual Report, Fiscal Year 1980* (Washington, DC: Government Printing Office, 1979), p. 115, chart 1-1.

Figure A-2. Example of Use of Relative Force Size Comparison.

Note: These charts reflect only one of several ways to compare forces, although they are more comprehensive than most. They do not reflect the basis on which we plan to use the forces. As is the case with all multi-year force comparisons involving different forces, they do not take into account certain operational refinements on each side such as capabilities of and allowances for theater purposes, range limitations, and uncertainties associated with command and control. It should be emphasized that the data on Soviet forces beyond 1979 are subject to considerable uncertainty, being projections.

- 1/ Relative force size is a measure of capability to destroy a given set of military and economic targets.
- 2/ These curves represent the forces on each side that could be generated (not counting units in overhaul, repair, conversion, or storage).
- 3/ These curves show U.S. day-to-day alert forces that have survived a counterforce attack, and Soviet residual day-to-day alert forces. If the U.S. forces had been on a generated alert prior to the attack, the number of U.S. forces surviving would be higher.
- 4/ These curves show U.S. day-to-day alert forces that remain after a U.S. counterforce retaliation. Soviet forces include surviving ICBMs, on-station SLBMs, any alert bombers, and those SLBMs and bombers that the Soviets had been able to generate after their first-strike. If the U.S. forces had been on a generated alert, the number of U.S. forces remaining after this retaliation would be higher.
- 5/ Both sides would remain capable of attacking a comprehensive list of "soft" military and non-military targets at this point. For this reason, the hypothetical differences between these forces might or might not be meaningful.

Figure A-2. Example of Use of Relative Force Size Comparison—continued.

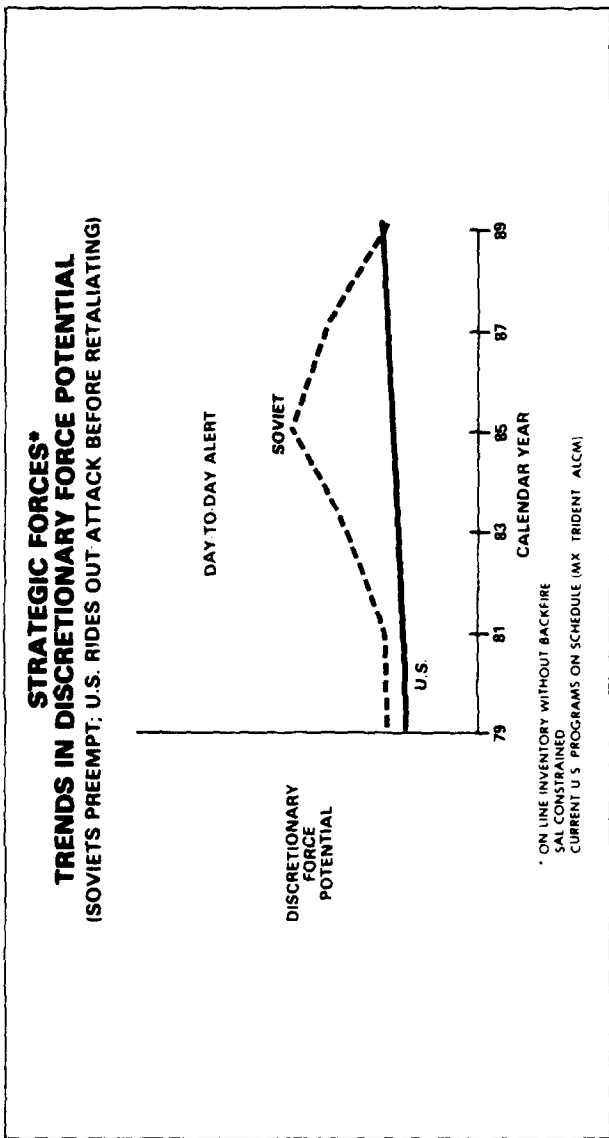
force potential and portrays the extent to which an arsenal achieves, or exceeds, goals for several categories of targets. An example, from the fiscal year 1982 Chairman's *Military Posture* statement, is shown in figure A-3.

This measure uses a different target base for each arsenal (that is, the United States attacks USSR targets, and the USSR attacks US targets) but assumes the same goals for each attacking force. First, each side attacks all silos (and shelters assumed for MX), and then it sequentially allocates weapons to achieve goals in each prioritized category of targets. As with RFS, the user must exercise care in interpreting discretionary force potential as a measure of nuclear warfare.

Another measure which has been influential is that used by SAC to support its analysis of strategic forces. The most visible part of the SAC methodology, called military damage expectancy, is a measure of how well US forces can attack Soviet military targets. Our forces are measured after sustaining a comprehensive Soviet first strike and then retaliating to achieve specified damage levels against Soviet economic targets. Remaining US weapons, excluding those designated to be held in reserve, are then applied against Soviet military targets, and the aggregate percent of targets damaged is calculated.

A typical set of military damage expectancy curves from a 1981 SAC briefing on the strategic nuclear balance is shown below in figure A-4. Because this measure is high at both ends and low in the middle, its "bathtub" shape has given impetus to images of a "window of vulnerability," a period of dangerously low capability for US forces.

Each concerned agency usually develops its own methodology and concomitant dynamic measure, tailored to a specific interest or requirement. The Joint Chiefs of Staff evaluate the SIOP dynamically against a hypothetical Soviet SIOP, the RISOP (Red Integrated Strategic Offensive Plan), which is developed by the Studies, Analysis, and Gaming Agency of the Joint Chiefs of Staff. The Arms Control and Disarmament Agency has yet another approach suited to its needs for



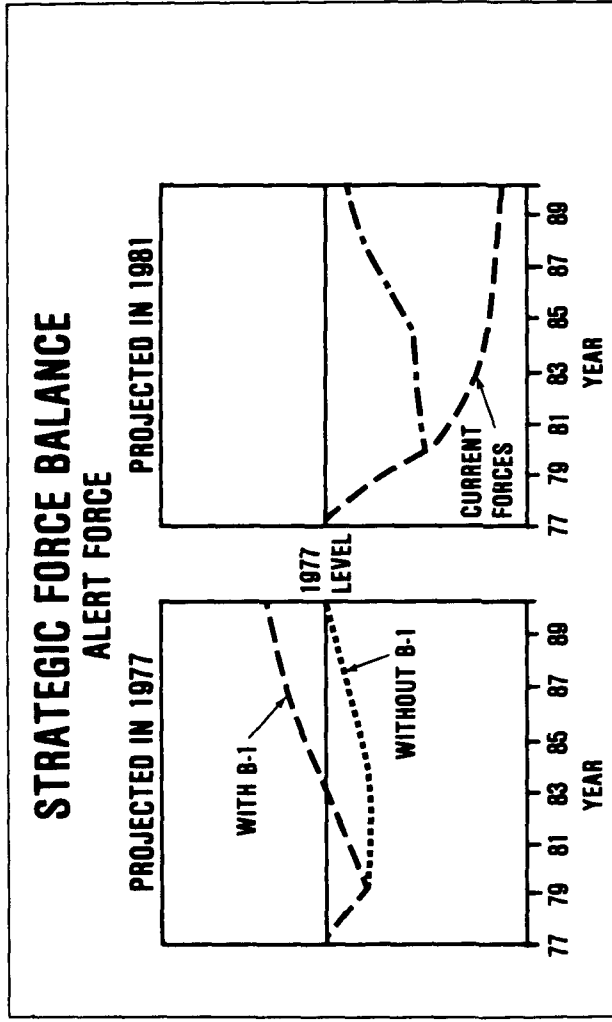
Source: US Joint Chiefs of Staff, *Military Posture for Fiscal Year 1982* (Washington, DC: Government Printing Office), p. 27, chart II-3.

Figure A-3. Example of Discretionary Force Potential Measure Use.

comparing arsenals, as do most consulting agencies and major defense contractors like Rand, Boeing Aerospace Corporation, and TRW.

The point to be made in examining these several approaches is to appreciate the unavoidable impact this diversity will have on attempts to evaluate a consistent strategic nuclear policy.

In measuring nuclear warfare, two factors are especially important here. Each user sees a slightly different need and tailors methodology accordingly. Second, those familiar with strategic analysis and its dynamic measures are also keenly aware of the several inadequacies of each approach and are disposed to develop a better or more complete methodology. An understanding of the limitations of current methodologies is important, particularly since several detract from attempts to measure a multiple-exchange war dynamically.



Source: United States Air Force, Strategic Air Command Briefing, "The Strategic Nuclear Balance," Headquarters SAC (XPS), 21 October 1981, chart 14.

Figure A-4. Example of Military Damage Expectancy Measure.

ENDNOTES

Chapter 1

1. For contrasting discussions of PD-59, see in the March 1981 (vol. XI, no. 1) edition of *Parameters*, articles by Louis Rene Beres, "Presidential Directive 59: A Critical Assessment," pp. 19-27, and by Colin S. Gray, "Presidential Directive 59, Flawed But Useful," pp. 28-37. Two thorough and authoritative explanations of PD-59 are former Secretary Harold Brown's remarks at the convocation ceremonies for the 97th Naval War College class, Naval War College, Newport, Rhode Island, 20 August 1980, and his description in the *Department of Defense Annual Report: Fiscal Year 1982*, particularly pp. 37-44.
2. US, Department of Defense, "The Defense Policy of the Reagan Administration," news release, remarks prepared for delivery by the Honorable Caspar W. Weinberger, Secretary of Defense, to the Council on Foreign Relations, New York, 17 January 1981, p. 7.
3. See specifically the remarks delivered by Harold Brown at the convocation ceremonies of the Naval War College, Newport, Rhode Island, 20 August 1980. Dr. Brown speaks of PD-59 as "codifying our restated doctrine" and describes the implementation of this doctrine through a "countervailing strategy."
4. President Nixon in his Report to Congress, "US Foreign Policy for the 1970's," 18 February 1970.
5. Desmond Ball, "Counterforce Targeting: How New? How Viable?," *Arms Control Today* 11 (February 1981): p. 2.
6. US, Congress, House, Committee on Armed Services, *Hearings on Military Posture and H.R. 1872*, 96th Cong., 1st sess., 1979, p. 9.
7. Richard Burt, "The New Strategy for Nuclear War: How it Evolved," *New York Times*, 13 August 1980, p. A3.

8. Harold Brown, speech at Newport, Rhode Island, 20 August 1980, p. 6: "Let me emphasize that PD-59 is *not* a new strategic doctrine.... It is ... a codification of previous statements of our strategic policy."

9. *Ibid.*, p. 7.

10. Caspar W. Weinberger, remarks by Secretary of Defense Weinberger to the Council on Foreign Relations, New York City, 17 June 1981, p. 7.

11. *Ibid.*, briefing on strategic weapon systems at the White House, 2 October 1981. See answers to questions on pages 1, 6, and 7.

12. For an excellent discussion of the Soviet views of nuclear weapons and their utility in war, see the paper entitled "Soviet Views of General War," by Eugene P. Gay and Gordon F. Negus, January 1979 (available through Air Force Studies and Analyses, Headquarters, USAF).

13. See, for example, Secretary of Defense Weinberger's address, "US Military Strategy for the 1980s," in *The 1980s: Decade of Confrontation*, National Security Affairs Conference, 1981 *Proceedings*, (Washington, DC: Government Printing Office, 1981), p. xiii. President Reagan's concern is reflected in one of his first acts as President, in which he directed attention to strengthening the US defense production base. In his statement of 13 March 1981, "National Defense Stockpile of Strategic and Critical Materials," the President discussed defense production and "ways to expand domestic capacity to produce strategic and critical materials."

14. See *Weekly Compilation of Presidential Documents*, 2 October 1981. As further evidence of emphasis on US civil defense, President Reagan issued National Security Decision Directive 26, "US Civil Defense Policy." It directs the US civil defense program to "enhance deterrence and stability in conjunction with our strategic offensive and other strategic defensive forces."

15. US, Department of Defense, *Soviet Military Power* (Washington, DC: Government Printing Office, 1981), pp. 68-69. Soviet hardening and dispersal activities are discussed in the Soviet civil defense section. The Soviets are also hardening many of their important military installations.

Chapter 2

1. US, Department of Defense, *Annual Report, Fiscal Year 1982* (Washington, DC: Government Printing Office, 1980), pp. 41-42.

2. Eugene P. Gay and Gordon F. Negus, "Soviet Views on General War," January 1979, p. 12 (available through Air Force Studies and Analyses, Headquarters, USAF).
3. Grayson Kirk and Niles H. Wessell, eds., *The Soviet Threat* (New York: The Academy of Political Science, 1978), p. 91.
4. Leon Gavre, Foy D. Kobbv, and Mose L. Harvey, *The Role of Nuclear Forces in Current Soviet Strategy* (Coral Gables, Fla.: Center for Advanced International Studies, 1974), p. 21.
5. J.D. Douglas and A.M. Hoerber, "Soviet Military Thought on Global Nuclear War," unpublished manuscript, Washington, DC, December 1970, pp. 45, 46, and 52.
6. William T. Lee, *The Soviet Views of the US-USSR Balance of Power and Deterrence* (Palo Alto, Calif.: Center for Planning and Research, May 1978), p. 17.
7. Gay and Negus, "Soviet Views," p. 15.
8. John M. Collins, *US-Soviet Military Balance: Concepts and Capabilities, 1960-1980* (New York: McGraw-Hill, 1980), p. 444-457.
9. See the results of "Saber Connector One, An Analysis of Strategic Command, Control, and Communications Systems," available from Air Force Studies and Analyses, Headquarters, USAF, 1980. A thorough discussion of the vulnerabilities and limitations of current C³ systems can be found in Desmond Ball's *Can Nuclear War Be Controlled?*, Adelphi Papers, no. 169 (London: The International Institute for Strategic Studies, Autumn 1981). See particularly chapter 2, "The Vulnerability of C³ Systems," beginning on p. 9, and appendix 1, p. 38.
10. Stephen M. Millett, *Soviet Perceptions of Nuclear Strategy and Implications for US Deterrence*, Economics and Policy Analysis Occasional Paper, no. 18 (Columbus, Ohio: Battelle Memorial Institute, April 1981), p. 11.
11. For the perspectives of a former Commander of the Strategic Air Command, see Bruce K. Holloway's article "United States Grand Strategy for the Next Ten Years," in *Grand Strategy for the 1980s*, ed. Bruce Palmer, Jr. (Washington, DC: American Enterprise Institute, 1978), p. 28.
12. US, Congress, House, Committee on Armed Services, *Hearings on Military Posture and H.R. 1872*, 96th Cong., 1st sess., 1979, p. 9.
13. *Ibid.*, p. 19.

14. See, for example, Secretary of Defense Caspar Weinberger's remarks, "US Military Strategy for the 1980s," 14 July 1981, before the National Security Affairs Conference, Fort McNair, Washington, DC. He states, "we must be able to prevent an adversary from achieving a military advantage through nuclear war, even a *protracted* one [emphasis added]."

15. Robert Strausz-Hupe, et al., *Protracted Conflict* (New York: Harper, 1959).

16. "A Strategic Analysis of Protracted Nuclear War," available through Air Force Studies and Analyses, Force Analysis Division, Strategic and Force Analyses Directorate.

17. The previously cited work by Negus and Gay contains persuasive evidence of the Soviet's historical disposition for warfighting, with nuclear weapons as a foundation of their strategic force posture.

In response to the US Department of Defense publication, *Soviet Military Power* (Washington, DC: Government Printing Office, 1981), the Soviets countered with their version of the truth entitled *Whence The Threat To Peace?* from the USSR Ministry of Defense (Moscow: Military Publishing House, 1982). In section IV, "Two Trends in World Politics," p. 76, the Soviets assert that they are "fundamentally opposed to . . . recourse to war or the threat of force as an instrument of foreign policy," and on page 77, "The USSR . . . is not going to attack anybody."

Chapter 3

1. Caspar W. Weinberger, remarks by Secretary of Defense Weinberger to the Council on Foreign Relations, New York City, 17 June 1981, p. 7.

2. US, General Accounting Office, *Countervailing Strategy Demands Revision of Strategic Force Acquisition Plans*, 5 August 1981, p. 40.

3. Data furnished by the Boeing Company.

4. US, Department of the Air Force, *Flight Manual*, Technical Order 1B-52H-1-1, appendix 1, Performance Manual, 15 May 1961 as amended.

5. "Concepts for Protracted War," a study by the Boeing Company, Seattle, Washington, 5 August 1980, p. 156. (Used by permission of the Defense Nuclear Agency.)

6. US, Department of Defense, *Annual Report, Fiscal Year 1982* (Washington, DC: Government Printing Office, 1980), p. 53, table 4-2.

7. "Concepts for Protracted War," p. 59.
8. *Weekly Compilation of Presidential Documents*, 2 October 1981, p. 1075.
9. "National Security: Why C³I Is The Pentagon's Top Priority," *Government Executive*, January 1982, p. 14.
10. US, Congress, House, Committee on Armed Services, *Hearings on Military Posture and H.R. 1872*, 96th Cong., 1st sess., 1979, p. 36.
11. "Saber Connector One, An Analysis of Strategic Command Control and Communications Systems," available from Air Force Studies and Analyses, Headquarters, USAF, 1980.
12. The worst-case estimates for SLBM warning, according to testimony of General Royal B. Allison, range from about 4½ minutes to 8½ to 9 minutes, which "might be extended to a round-off figure of 10 minutes." US, Congress, Senate, Armed Services Committee, *Military Implications of the Treaty on the Limitations of Anti-Ballistic Missile Systems and the Interim Agreement on Limitation of Strategic Offensive Arms*, Hearings, 92d Cong., 2d sess., 1972, p. 345.
13. Desmond Ball, *Can Nuclear War Be Controlled?* Adelphi Papers, no. 169 (London: The International Institute for Strategic Studies, Autumn 1981), p. 17.
14. For an excellent discussion of SIOP structural problems, see Richard Lee Walker's monograph, *Strategic Target Planning; Bridging the Gap between Theory and Practice* (Washington, DC, Government Printing Office, 1983).
15. Hon. William P. Clark, National Security Adviser to the President, remarks to the Center for Strategic and International Studies, Georgetown University, 21 May 1982.
16. Desmond Ball, "Counterforce Targeting," p. 1.

Chapter 4

1. Colin S. Gray, "Presidential Directive 59: Flawed But Useful," *Parameters*, March 1981, p. 29.
2. *Weekly Compilation of Presidential Documents*, 2 October 1981, pp. 1074-75.
3. US, Department of Defense, "Remarks by the Secretary of Defense on Strategic Programs Overview," before the Senate Armed Services Committee, October 5, 1981.

4. *Ibid.*, p. 4.

5. *Ibid.*, pp. 4-5.

6. "National Security: Why C³I Is the Pentagon's Top Priority," *Government Executive*, January 1982, p. 14.

GLOSSARY

ACDA	Arms Control and Disarmament Agency
ALCS	Airborne Launch Control System
CEP	circular error probable
C ³	command, control, and communications
C ³ I	command, control, communications, and intelligence
ICBM	intercontinental ballistic missile
MOE	measures of effectiveness
NCA	national command authority
NEACP	National Emergency Airborne Command Post
NSDD	National Security Decision Directive
NSDM	National Security Decision Memorandum
NUWEP	Nuclear Weapons Employment Policy
PD	Presidential Directive
RFS	relative force size
SAC	Strategic Air Command
SIOP	Single Integrated Operational Plan
WIOP	Warfighting Integrated Operational Plan

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