

# **STRATEGIC NUCLEAR TARGETING**

Dissertation submitted to the Jawaharlal Nehru University  
in partial fulfilment of the requirements  
for the award of the Degree of  
**MASTER OF PHILOSOPHY**

**JYOTI SHANKAR CHOUDHARY**

DISARMAMENT STUDIES DIVISION  
CENTRE FOR INTERNATIONAL POLITICS,  
ORGANIZATION AND DISARMAMENT  
SCHOOL OF INTERNATIONAL STUDIES  
JAWAHARLAL NEHRU UNIVERSITY  
NEW DELHI-110067, INDIA

1991



CIPOD/SIS/JNU

July-1991.

**CERTIFICATE**

Certified that the dissertation entitled "STRATEGIC NUCLEAR TARGETING" submitted by Mr. JYOTI SHANKAR CHOUDHARY in fulfillment of six credits out of total requirements of twenty four credits for the award of the degree of MASTER OF PHILOSOPHY (M. Phil.) of the University is his original work and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any other degree of this University or any other University to the best of our knowledge.

*Sumitra Chishti*

PROF. SUMITRA CHISHTI  
CHAIRPERSON  
CIPOD/SSS/JNU

*M. Zuberi*

PROF. M. ZUBERI  
SUPERVISOR

**TO  
MA AND BABUJI**

## CONTENTS

		Page no.
	ACKNOWLEDGMENTS	
	ACRONYMS	
	INTRODUCTION	1 - 6
Chapter One	STRATEGY AND TARGETING	7 - 19
Chapter Two	AMERICAN NUCLEAR TARGETING	20 - 57
Chapter Three	BRITISH AND FRENCH NUCLEAR TARGETING	58 - 90
Chapter Four	SOVIET NUCLEAR TARGETING	91 - 103
	CONCLUSION	104 - 109
	APPENDIX	i - XXVI
	BIBLIOGRAPHY	110 - 115

## ACKNOWLEDGMENTS

It is with appreciation that I acknowledge the support of several individuals in preparation of this dissertation. I express gratitude to my guide Prof. M. Zuberi who so affectionately suggested modifications and smoothed rough edges in the text.

My family members, and especially my brother Sunil has been a great source of inspiration to me. I would also like to mention my childhood companions, Chandru, Bibhuti, and Vijay, for helping me with the proof reading.

A special thanks to Maithili Ganjoo who so generously provided me her advice, encouragement and detailed critical comments.

July, 1991

*Jyoti Shankar Choudhary*  
JYOTI SHANKAR CHOUDHARY

19.7.1991.

## ACRONYMS

AEC	-	Atomic Energy Commision
ALCS	-	Airborne Launch Control System
ASAT	-	Antisatellite Weapon
BMD	-	Ballistic Missile Defence
CF	-	Counterforce
C <sup>3</sup> I	-	Command, Control, Communications, and Intelligence
CV	-	Countervalue
DSTP	-	Director, Strategic Target Planning
FR	-	Flexible Response
FY	-	Fiscal Year
ICBM	-	Intercontinental Ballistic Missile
IRBM	-	Intermediate Range Ballistic Missile
JCS	-	Joint Chiefs of Staff
JSOP	-	Joint Strategic Objectives Plan
JSTPS	-	Joint Strategic Target Planning Staff
LNO	-	Limited Nuclear Option
LOA	-	Launch on Assessment
LOW	-	Launch on Warning
LUA	-	Launch Under Attack
MAD	-	Mutual Assured Destruction
MIRV	-	Multiple Independently Targeted Re-Entry Vehicle
MRV	-	Multiple Re-Entry Vehicle

MR	-	Massive Retaliation
NATO	-	North Atlantic Treaty Organisation
NCA	-	National Command Authorities
NSC	-	National Security Council
NSDD	-	National Security Decision Directive
NSDM	-	National Security Decision Memorandum
NSTL	-	National Strategic Target List
NTPR	-	National Targeting Policy Review
NUWEP	-	Nuclear Weapons Employment Policy
PD	-	Presidential Directive
PRM	-	Presidential Review Memorandum
SAC	-	Strategic Air Command
SACEUR	-	Supreme Allied Commander, Europe
SAM	-	Surface-To-Air Missile
SIOP	-	Single Integrated Operational Plan
SLBM	-	Submarine Launched Ballistic Missile
SSBN	-	Nuclear Powered Ballistic Missile Submarine
TVD	-	Teatr Voyennykh Deystviy (Theater of Military Operations),
VGK	-	Supreme High Command (USSR)

## INTRODUCTION



## INTRODUCTION

It is sometimes said that an age passes when its basic illusions crack, and Hegel said that an understanding of a social system comes only when it is on the road to extinction. For more than forty years, mankind has walked through the valley of the shadow of nuclear deterrence. There has been order between the major power blocs, but also unprecedented danger. Many believe the risks of breakdown have grown over the years. Even if the risks are not as great as widely believed, what might be destroyed is so infinitely precious that even a slight increase in the possibility of nuclear war can never be other than of compelling importance.

One of the most profound disparities in Soviet and American approaches to military and nuclear strategy lies in their fundamentally dissimilar historical approaches to the relationship between politics and war. With respect to military strategy, Americans are neo-Jominions and neo-Uptonions, whereas the Soviets remain followers of the teachings of Clausewitz and of the neo-Clausewitzians among the Marxists and Leninists.

Baron Antoine Henri de Jomini, one of the most influential military strategists of the nineteenth century, maintained that the study and conduct of war was a science that could be reduced to fixed rules and mathematical formulas. He believed that although technologies and techniques of war might

change, its principles are unchanging. This notion is influenced by the spirit of the Enlightenment and the positive, optimistic American (and English) tradition of democratic liberalism, which envisaged man's ability to control, manage, and order society and forces of conflict by rational, scientific, and technological means. This tradition in the nuclear era finds reflections in the optimistic premises of crisis management and arms control. The American fascination with exact control and manipulation of levels of violence, with computer models and complex scenarios of conflict, with the quantification of Defence and war management resulted in the development of nuclear war strategies which, according to Walter Lippmann, embodied the perfect fulfillment of all wishful thinking of military matters.

This simplistic view of war has somewhat changed due to the loss of American nuclear monopoly and later a nuclear stalemate. But the requirement for the effective punishment of an aggressor, with minimal effort and cost stand as valid today as it was in the immediate post-world-war II period.

The second major distinguishing characteristic of American strategic thought derives from the separation of strategy not only from politics but also from the serious consideration of adversary interests, values and motives. This follows the tradition of General Emory Upton, who believed that war and politics are diametrically and fundamentally different. In other words strategy begins where politics ends. The Americans

believe that war is too complex for the average citizen to comprehend and that it should be better left with experts.

The soviet strategic thinking, on the other hand, has different historical roots. The core of their strategic theorising and military planning is influenced by Carl Von Clausewitz and The neo-Clausewitzians in the Marxist tradition, including Marx, Engels, Lenin, Trotsky, and Stalin War for them is not a body of fixed principles. Clausewitz had rejected the optimism and dogmatism of the eighteenth century theory and propounded that war was neither a scientific game nor an international sport, but an extreme act of violence: "We do not like to hear of generals who are victorious without the of blood",<sup>1</sup> because the resulting altitude can lead to an underestimation of the ugly faces of war and can impute a false sense of security and control over events.

Freidrich Engels, popularly known as the 'Red General', laid down the Marxist precepts of war which he derived from Clausewitz. According to him, "Fighting is to war what cash payment is to trade, for however rarely it may be necessary for it actually to occur, everything is directed towards it, and eventually it must take place all the same, and must be decisive."<sup>2</sup> This perception of war seeped in horror was endorsed

by Leo Tolstoy who said, "Let war be war, and not a game".<sup>3</sup>

1. H.Rothfels, "Clausewitz", in Edward Mead Earle, ed., Makers of Modern Strategy (New York : Atheneum, 1966}, pp.99-100.

2. Quoted in Earle, n.1, p.158.

The current position of Soviet strategists on the unsuitability of fixed dogmas of war and on the need to adopt strategy and doctrine to the given objective national and political conditions, goes back to their revolutionary origins and the creation of the 'Red Army'. Trotsky, the founder of the 'Red Army', cited Clausewitz in arguing that in practical military acts one should not drive the flowers and foliage of theory too high, one should rather keep them close to the soil of experience. Besides in rejecting the notions of strategy as science, he pointed out that each school of thought merely reflected temporary conditions of national existence.<sup>4</sup>

It is worth mentioning that in the Soviet Union, the dominant expert elites traditionally entrusted with the development of strategic theories and policies have been military professionals under the guidance of the Party leadership. In the United States on the other hand, in the postwar period, this function became dominated by civilian Defence intellectuals under the ambiguous guidance of an ever changing political leadership.

The current strategic thought in Britain and France can't be assigned to a particular line of thought. What appears

---

3. Quoted in Robert Osgood, Limited War : The Challenge to American Strategy (Chicago : Chicago University Press, 1957), p.33.

4. I. Deutscher, The Prophet Armed (Oxford : Oxford University Press), 1976, p.484.

more probable is that these two countries have tried to blend the two streams of Jomini and Clausewitz. Thus, both Britain and France have refrained from espousing everlasting dogmas and principles of war. Infact the emphasis is more towards the 'need of the hour' approach. This explains their efforts to develop credible deterrents of their own. At the same time, it is assumed that British and French nuclear arsenals will be used in tandem with that of America. Therefore, American strategy and policy is bound to have at least some influence on the British and French strategic thinking. This in a way exposes the dilemma which the NATO countries face. The dilemma of Hamlet's 'to be or not to be' gets profoundly reflected in their strategic thinking. The crucial question for them is whether to build up credible deterrent of their own, which would mean billions of dollars every year spent in upgrading technology alone, or, rely on the United States to come to their rescue on the doomsday.

In this study, an attempt has been made to probe the various war plans adopted and upgraded by the four principal recognised members of the nuclear club-United States of America, Soviet Union, Britain, and France. And in all this, the main focus is on the issue of nuclear targeting-targeting what, why, and by whom. A word about china here. China, the fifth recognised nuclear power, has been left out from this study as not much published material on the topic is available. Whatever little is at hand does not fully spell out a coherent strategic

thinking. This is not to suggest that it does not have one. Surely it does exist, but to outsiders it seems more like a jigsaw -puzzle with possibly a few vital components missing.

The entire work is divided into four chapters. Chapter One briefly explains strategy as a concept and what it has meant down the ages and in particular after the advent of nuclear weapons. It also focuses on the notion of targeting and its various aspects.

The second chapter fully explains the American nuclear war planning and targeting process. The flood of information does make the war planners have vacillated between counterforce and countervalue targeting and how it all invariably ends up in stressing upon an 'overkill' capacity.

The penultimate chapter deals with the British and French nuclear targeting. It fully explores why these two nations went for independent deterrents and how they intend fighting out a nuclear war.

The Fourth and the last chapter tries to read the Soviet mind on the issue of nuclear war fighting. Again, due to the closed nature of the soviet society, the gathered information is mostly from the western sources, barring a few notable works emanating from the Soviet scholars.

The concluding note summarises what has been talked about in the preceding chapters.

## **CHAPTER ONE**

## Chapter One

### STRATEGY AND TARGETING

#### STRATEGY:

Strategy is, as one of the scholars has remarked, a deadly business<sup>1</sup>. It is concerned with the darker side of human nature, in that it examines the way in which military power is used by governments in the pursuit of their interests. And because military power refers to the capacity to kill, to maim, to coerce and destroy, it follows that it is a crude instrument.

For a layman, strategy is intimately connected with planning wars and fighting them. This popular impression is reinforced by Clausewitz's definition of strategy as "the employment of battle as the means towards the attainment of the object of war"<sup>2</sup>. However, strategy is this and much more. Fundamentally, it is about the ways in which military power may be used to achieve political objectives. Von Moltke described strategy as "the practical adaptation of the means placed at a general's disposal to the attainment of the objects in view"<sup>3</sup>.

- 
1. K. Booth, "Teaching strategy: An Introductory Questionnaire", Survival; 1974 March/April; p.79
  2. Von Clausewitz, On war I, J.J. Graham, trans. (London :Routledge, 1908), p.165.
  3. Quoted in B.H. Liddell Hart, Strategy: The Indirect Approach (London : Faber, 1967), p.134



Therefore, the subordination of strategy to politics is generally accepted.

In ancient Greece strategy was the art of the general (strategos) simply, but in the modern epoch a distinction came to be drawn between strategy as the art and theory of concerting battles for the purpose of victory (Clausewitz)<sup>4</sup>, and strategy as an overall design for competitive struggle between powers (Liddell Hart's 'grand strategy').<sup>5</sup> The contemporary discipline of strategic studies is not centrally concerned with grand strategy, and, although it does embrace the art of the general as traditionally conceived, its chief concern is not victory but the deterrence of central war.

It is worth noting that the spur to strategic theory in the past has often been the perceived crisis of a civilisation. Many western strategists believe that such a crisis has been posed by the thermonuclear bomb and the challenge of the communist world since 1945. Thucydides feared the disunity of the Greeks in facing a great Asiatic empire.<sup>6</sup> Machiavelli yearned for a military genius to unify the turbulent Italian peninsula of the fifteenth century against the interference of

---

4. Clausewitz, n.2

5. Liddell Hart, n.3

6. Thucydides, The Pelopponesian War, (Harmondsworth : Penguin Books, 1961).

European empires.<sup>7</sup> Clausewitz's ideological and political priorities were less clear cut, but he was deeply concerned to meet the intellectual challenge of the permanent political and military revolution that Napoleon Bonaparte had brought about in Europe, notwithstanding Waterloo. Clausewitz sought to elicit what the mass conscript armies and fervent nationalism of the Napoleonic era portended for the theory and conduct of war. Without entering into moral philosophy, he demanded that due proportion be observed between the political goals of war and the military means chosen to pursue them—a timely warning not only in view of the mass armies available to European statesmen, but also because the instruments of war were about to begin that never-ending sequence of technological revolutions made possible by the industrial revolution. Finally, the point of departure for Liddell Hart's theory of the 'indirect approach', entailing a principle of economy in lives, material and military effort, was his first-hand experience of European self-immolations on the battlefields of the first world war. Theorists of the nuclear age have had difficulty in finding a contemporary equivalent of the indirect approach, at least in the strategic relationship of the superpowers where any military clash carries a possibility of oblivion. But the influence of Liddell Hart may be discerned in the theory of limited (non-nuclear) war.

---

7. Niccolo Machiavelli, The Prince, (Harmondsworth : Penguin Books, 1961).

It is Clausewitz's idea that war is the continuation of diplomacy by other means which has been of fundamental importance to the nuclear age theorists. Can any political goal justify invoking nuclear weapons? Can nuclear war be fought in a way that ensures the survival of civilised values? These were the questions which launched strategic studies in the late 1950s and early 1960s. The title of Herman Kahn's classic, On Thermonuclear War deliberately echoes the title of Clausewitz's masterpiece.<sup>8</sup> Thomas Schelling was concerned to show that the threat of nuclear war and nuclear acts of hostility are the distinctive post-Hiroshima method of continuing diplomacy by other means. Both these American theorists were convinced that civilisation could survive nuclear use - Kahn for dated technical reasons (he thought an American first strike against the USSR could be made to work), and Schelling because he believed that nuclear-weapons concentrate the minds of diplomats on avoiding all-out war as never before, and that the nuclear allergy of opponents is susceptible to exploitation short of catastrophe.<sup>9</sup>

The notion that limited nuclear war of one kind or another is both possible and politically necessary underlies the central tradition of strategic theorising in the United States.

---

8. Herman Kahn, On Thermonuclear War (Princeton : Princeton University Press, 1959).

9. Thomas C. Schelling, The Strategy of Conflict (Cambridge : Harvard university Press 1960). and Arms and Influence (New Haven : Yale University Press, 1966).

However, there has always been a dissenting minority stream which favours Minimum Deterrence the abjuring of counterforce targeting plans and the large, quick-reaching, accurate strike force, that would execute them and of the technical and political-administrative capacity to execute small-scale counter-force or countervalue 'slow motion' attacks. (In general one may classify potential nuclear targets as counterforce, or countervalue. A counterforce target is a centre that has some military value, such as a missile silo; bomber base, submarine base, command centre, or even a conventional military base. Countervalue targets by contrast, are the population, economic, or political resources of a nation. Outside the jargon of strategic analysts, a countervalue target is a city. To have a countervalue targeting policy, therefore, is to envision the intentional destruction of the adversary's cities and as much of its civilization as possible, in what has often been called a 'city busting' nuclear policy. Accordingly fundamental point of order for a country is to decide whether its nuclear policy is to be based on the destruction of military or urban targets). The current official expression of the mainstream view is the theory of selective, flexible strategic response-what former President Jimmy Carter's Secretary of Defence, Harold Brown, called 'countervailing strategy'-which envisages an initial effort at least to confine nuclear, hostilities to non-value targets.<sup>10</sup>

---

10. Harold Brown, Report of the Secretary of Defence, fiscal year 1981, (Washington, D.C. : USGPO, 1980).

However, strategists of both the Minimum Deterrence school and the counterforce school believe that the Defence of the West, the protection of its interests and the containing and curbing of the Soviet Union justify not only the deployment of a panoply of nuclear means and the issuing of nuclear threats, but, ultimately, nuclear use, including all-out nuclear strikes against civilian targets as a first or last resort.

Strategic studies in the nuclear period was a western invention; but by the end of the 1950s, comparable intellectual exertion was beginning to appear elsewhere. The Soviet approach to strategic questions was and remains sui generis. The Soviets, beginning with Lenin himself, have been keen students of Clausewitz, and there are echoes of him in the major Soviet works on nuclear strategy. But Soviet strategy, in contrast to the western ones, is primarily the work of active or retired military officers and has a self-serving quality to the extent that the political utility of nuclear war tends to be assumed rather than proven.<sup>11</sup> Soviet practitioners seem to be little interested in elaborating theories of deterrence and crisis control; they show aversion to arms control; and they profess to believe that limitation of nuclear war between the superpowers is impossible or virtually so. But the notion that Soviet strategic forces exist to restrain the imperialists from launching a surprise

---

11. V.D. Sokolovskii, Military Strategy, (London : Macdonald and Jane's, 1975).

attack on the Soviet Union is of course a deterrent notion; Soviet theorists certainly promise to deliver an all-out blow in response to such an attack.

Where Soviet theory is supposed to differ from the western variety is in targeting philosophy-population destruction as such is not emphasised, but rather the reduction of hostile sources of military, industrial and administrative strength.

Deterrence is central in East and West, but the notion has been elaborated in the West in a way which displays the overall defensive posture of the western powers since 1945. Western Defences and strategic diplomacy are supposed to deter not only central war but Soviet attacks and hostile pressures in Europe, and also communist-supported insurgency and other 'trouble-making' in the Third World. It has been argued that American participation in the Vietnam war itself was a tribute to the potency of deterrence theory. Stalemated at the nuclear level after the Soviet Union acquired long-range nuclear strike capability in the late 1950s, the United States felt that Khrushchev's challenge to contest the 'grey areas' of the Third World at the sub-nuclear level would have to be met in kind by counter-guerrilla and mobile conventional forces. Intervention in Vietnam was thus considered a strategic necessity on a transformed global chessboard, and America's general credibility, including her strategic nuclear credibility, was at stake in Vietnam.

The doctrine of graduated deterrence postulates a hierarchy of levels of threat-typically 'brushfires' (Soviet supported guerrilla struggle), proxy wars (such as have occurred repeatedly in the West Asia and Indochina); limited wars outside Europe with direct superpower involvement (such as Korea); limited or theatre wars in Europe (which might be nuclear) and finally central war. Concentrating at the upper end of the escalation ladder, the threat of theatre nuclear strikes tends to deter adventurous Soviet action of any kind in Europe, according to orthodox theory; but so does the linked threat of escalation to strategic warfare. At the strategic level the requirements of deterrence are now defined to include counter force strategic strikes proper (counter-silo, counter-bomber and counter-SLBM etc.); strikes at the military and political commanding heights and communications of the enemy, strikes at conventional military targets; strikes at the sources of military production; and finally strikes at the so-called recovery capabilities-the basic capital stock and possibly even the food resources of the enemy economy. Recently American policy has been to require that in the last analysis 70 per cent of Soviet recovery resources should be destroyed.

## **TARGETING**

The practical problems of targeting nuclear forces can result in striking confrontation between decision makers'

declared objectives and those that are technically and operationally feasible. Such confrontations arise largely from weapon effects and operational constraints. They can also arise from less fundamental sources, such as the characteristics of available forces, which may have been procured without regard to their effective application.

There are two broad classes of targets : fixed and mobile (or transportable). Since the location and characteristics of fixed targets are precisely known, elaborate targeting plans can be constructed in advance of possible hostilities. Examples of fixed targets of potential military interest are rail yards, road junctures, bridges, airports (military and civilian), command bunkers, communications facilities, ports, fixed Defences, industrial facilities, and nuclear storage sites. In contrast, location and characteristics of mobile targets might be known only a short time before weapons are delivered. Examples of mobile targets are troop concentration or mechanised forces, mobile missiles (SS-20s, SS-24s, SS-25s, cruise missile launchers etc.) dispersed aircraft, mobile command or communications centers, and mobile surface-to-air missile units (SAMs). Attacking these targets require surveillance capable of providing timely information about the location and character of the targets as well as forces capable of rapid re-targeting. Planning must also deal with enemy countermeasures to confuse or destroy sensors.



## MECHANICS OF TARGETING

The process of preplanning large nuclear attacks against many fixed installations is simple in concept, but complex and subtle in detail, posing significant questions for policy makers.

The first step in attack planning is selecting targets. Both target selection and the establishment of priorities among them are governed by doctrinal and military judgments that are necessarily partly subjective. Targets may be selected because they have direct military value, because they perform important functions for civilian or military leadership (protection, communications support, and so on), because they could indirectly support the enemy war effort, or because they are judged vital to postwar recovery. Targets in the Washington area, for example, can be recognised according to these doctrinal criteria : they are a base or potential base for military operations (Andrews Air Force Base, National Airport); they directly support military operations (Central Intelligence-Agency, Defence Mapping Agency, Pentagon, Navy Yard, Naval Research Laboratory); they perform functions for civilian or military leadership (White House, Capitol Hill, Pentagon); or they are judged to be important facilities that could aid postwar recovery (Naval Research Laboratory, Navy Yard). Other installations that could also be selected as targets in the last category are energy facilities (such as electric and petroleum production), navy and light

civilian and military production (such as steel, transportation equipment, electronics, and chemicals), and military and industrial storage facilities (such as petroleum and chemical storage and storage sites for tanks, trucks, ships, and nuclear weapons).

Once the targets are selected, judgments are then made about the damage objectives for each. If the objective is complete destruction of leadership and support structures, the opinion of the planner may be that high levels of damage are required. Since the Capitol Hill, the Pentagon, and the Central Intelligence Agency are reinforced monumental structures, a blast of 40 pounds per square inch (psi) might be considered necessary to reduce these structures to rubble. Since the White House may have underground bunkers associated with it, a 40 psi blast might also be needed there as well. A certain number of missiles, bombers, cruise missiles, and short-range attack missiles would be expected to suffer mechanical failure during their flight and some warheads might not explode when delivered. The engineering reliability of each system used to deliver warheads must also be considered by the planner. The probability that the desired level of damage will be achieved against each target or set of targets is influenced by several factors. This probability is called damage expectancy and is usually expressed as the following product of probabilities.

DE = damage expectancy is composed of :

- Pk = the probability of killing the target
- PTP = the probability of penetrating air Defences
- PLS = prelaunch survivability (probability that systems survive enemy preemptive actions)
- RRE = the probability that systems function reliably.

If the damage expectancy from a single weapon cannot meet the planning goal, multiple weapons may be required. Similarly, to hedge against massive failures of an entire weapon type, weapons would be cross-targeted by different delivery systems.

As a result of continuing advance in guidance and computer technology, the wide variety of apparently attractive military applications of nuclear weapons, and the military and political promise offered by nuclear forces with apparently greater capability, both the United States and the Soviet Union have continually striven for larger, more diverse, and more flexible nuclear forces. Consequently, many of these systems, whether they are classified as strategic or tactical, can be quickly programmed to launch warheads against essentially any latitude and longitude within their range. If this increasing capability to retarget missiles rapidly is continued with surveillance, it is possible to consider expanded applications of ad hoc targeting against imprecisely located targets, such as dispersed land-mobile missiles (Soviet SS-20, SS-24 and SS-25, U.S. Pershing II, GLCM, Midgetman) or naval battle groups that

have been located by reconnaissance aircraft, submarine forces, or other surveillance systems.

The problem of adhoc planning against imprecisely located targets involves technical and tactical issues that are fundamentally different from those that must be addressed in targeting fixed installations. Even though the ability to retarget systems flexibly is already great and likely to improve still further in the near future, the problem of attacking mobile targets will not be similarly solved.

## CHAPTER TWO

## CHAPTER - Two

### AMERICAN NUCLEAR TARGETING

Historically the issue of the formulation of American nuclear strategy is addressed at four distinct levels. Three of these - high policy, strategic planning and operational planning - have been in existence since the advent of the atomic era. The fourth - programming - was inserted into the process in the 1960s, as a result of the Robert McNamara reforms. Except for this significant alteration, the whole structure has remained strikingly stable over time.

The topmost structure is high policy. The decision-makers at this level are the President and his advisors in the National Security Council., the Department of Defence. The ultimate responsibility to use nuclear weapons in war rests on this structure. Here the declaratory policy is developed and the undeclared policy worked upon. It answers the question how many what kind, what for and with what intentions the nuclear weapons ought to be used. Consequently, high policy determines the context for strategy-making at all the subsidiary levels.

Programming constitutes the next level of American nuclear strategy. This level was introduced in 1961 as part of Robert McNamara's de facto reorganisation and vitalisation of the role of the office of the Secretary of Defence. It prepares a

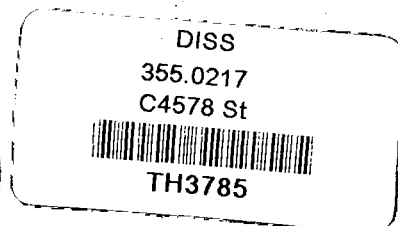
coordinated Defence Department budget, weapons procurement plan, and the annual or at least periodic statements of Defence and nuclear policy.

Strategic planning, which involves drawing up of general conceptual plans for the use of nuclear weapons in war, is the third level of nuclear strategy. In contrast with the first two levels, which are controlled by civilians, strategic planning is the responsibility of the military. It includes both the high deliberations of the Joint Chiefs of Staff, surrounding the production of annually updated force objectives and military capability and war plans, and the conceptual planning efforts of the individual services, often revolving around questions of resource distribution and thus, implicitly, of military philosophy and roles and missions.<sup>1</sup>

The final and lowest level of nuclear strategy making is that of operational planning. It involves the preparation of actual plans of wartime operations and employment, including detailed, concrete specification of individual targets, known as Desired Ground Zeros (DGZs), weapons and delivery systems to be used, weapons' effects, and routes to and times over targets.

Ideally, all four levels of strategy-making should work

- 
1. David Alan Rosenberg, "Reality and Responsibility : Power and Process in the Making of United States Nuclear Strategy, 1945-68", The Journal of Strategic Studies (London), Vol.9 (March 1986), p.37.



in close cooperation, with the goals and objectives established at the top guiding in detail activities at each subsidiary level. High policy should guide programming which in turn should shape strategic planning options. Strategic planning should determine the nature of operational plans. But a high level of coordination and integration have never been fully achieved. Strategic planning never completely responds to national policy; and neither policy nor strategy effectively controls operational planning. Force procurements specified at the programming level are not necessarily appropriate to enunciated policy at the top end of the strategy structure, not to strategic or operational planning requirements at the lower levels. Each level of strategy-making responds to a different set of needs and constraints producing contradictions and disjunction, and a striking divergence between stated policy and operational planning<sup>2</sup>

Externally three dynamics influenced the development of nuclear strategy in the United States. The first was technological change, which created new strategic challenges and options while setting real, though expanding, limits on how nuclear weapons could be employed .

The second was the work of strategic theorists, both inside and outside the government, who engaged in critical and

---

2. *ibid.*, p.38.



speculative inquiry into the possibilities and dangers of the nuclear era.

The third and most significant variable was intelligence estimates. The Central Intelligence Agency (CIA) controlled most U.S. Intelligence resources, but it had to battle the Air Force (and SAC), which had official responsibility for air intelligence, for such significant assets as the U-2 high altitude reconnaissance aircraft which began overflights in 1956 and the first reconnaissance satellites launched in 1960.<sup>3</sup>

Between 1945 and 1960, the United States developed and institutionalised a rigid, tightly coordinated approach to nuclear war planning. That process climaxed in August 1960, when President Dwight D. Eisenhower designated the commander in chief of the Strategic Air Command (SAC) as director of strategic target planning, with responsibility for preparing a National Strategic Target-list (NSTC) and a Single Integrated Operational Plan (SIOP) for massive, coordinated attack on a combination of target systems-counterforce, military, industrial, and governmental-within the Soviet Union, China, and the satellite nations, planned for the first twenty-four hours of a general war. The most recent version of the U.S. Single Integrated

---

3. David Alan Rosenberg, "U.S. Nuclear War Planning, 1945-1960", in Desmond Ball and Jeffrey Richelson, ed., Strategic Nuclear Targeting (Ithaca and London, 1986), p.37-38.

Operational Plan, formally designated SIOP-6, officially came into effect on 1 October, 1983 just twenty-three years after the preparation of the first SIOP, formally designated SIOP-62, which was completed in December 1960 and officially came into effect at the beginning of Fiscal Year 1962 on 1 July, 1961. Thus, right from 1945 to the present time the U.S. nuclear war fighting strategy has been constantly revised and updated.<sup>4</sup>

#### **NUCLEAR MONOPOLY-1945-1949**

The foundations of postwar nuclear strategy established in the Truman years were characterised by ambiguity. Harry Truman viewed the atomic bomb as the ultimate terror weapon : a weapon of last resort. He was unwilling or unable to provide clear policy guidance regarding how it should be integrated into war planning.

The extreme secrecy surrounding the nuclear weapons, so much so that even the president knew little about the size of the nuclear stockpile, further made coherent nuclear planning difficult. Even the Joint Chief of Staff (JCS) did not contemplate on any war plan until late 1947.

Not only the United States did not have any clear-cut policy during this period, its capabilities also did not enthuse much confidence. From 1945 through 1948, the vaunted era of

---

4. Rosenberg, n.3, p.35.

American nuclear monopoly, the nation's stockpile and delivery capability were extremely limited. There were only two weapons in the stockpile at the end of 1945, nine in July 1946, thirteen in July 1947 and fifty in July 1948. None of these weapons was assembled. Besides, no intercontinental bombers yet existed, although the United States had some B-29s based in England and Japan. It appears that early in 1948 there existed only 32 modified B-29s capable of carrying nuclear bombs. Additionally, personnel specially trained for nuclear weapons were quite scarce; by early 1947 the Strategic Air Command (SAC) had 20 trained air crews and only 6 weapons assembly specialists.<sup>5</sup>

The turning point came with the 'Sandstone' nuclear weapons tests. In the midst of the Berlin blockade in the spring of 1948, the Defence Department conducted a joint series of three test explosions code-named 'Sandstone' on the Eniwetok atoll, the last to be conducted under military auspices before the Atomic Energy Commission (AEC) over the responsibility for atmospheric test in 1951. 'Sandstone' demonstrated that many World War II era components of nuclear weapons were already obsolete, and indicated the need for more research reactors, an accelerated programme of material testing, and other engineering research and design.

---

5. Aaron L. Friedberg, "A History of U.S. Strategic Doctrine, 1945-80", Journal of Strategic Studies, 4,1, (March, 1981), p.40.

In the absence of accurate and elaborate military intelligence it became difficult for the war planners to target the Soviet Union. World War II experience had convinced air force planners that attacks on specific target systems, such as transportation networks and petroleum and electric power industries, were militarily more effective than the indiscriminate bombing of population centres. But the lack of weapons and inadequate intelligence prevented preparation of this type of plan. By the fall of 1947, one hundred urban centres had been identified for atomic attack, and some air force planners were beginning to talk about 'bonus effects and industrial capital' and 'what was a city besides a collection of industry?' From 1947 through 1949, the separate target systems within the Soviet Union grew less important in SAC plans, while governmental control centres and 'urban industrial concentrations' became primary objectives.

At least one war plan in this period needs to be mentioned. Conceived in 1949 and known as 'Dropshot', the plan called for SAC to mount six thousand sorties against the Soviet Union and occupied territory, using three hundred atomic bombs and twenty thousand tons of high explosives.<sup>6</sup> Targets for

---

6. Anthony Cave Brown, ed., Dropshot (New York, Dial, 1978), p.24. The United States did not possess three hundred atomic bombs in 1949. Dropshot was intended for a mid-1950s conflict.

nuclear attack were in the hundred largest Soviet cities.<sup>7</sup>

EARLY YEARS : 1949-1953

US expectations of a lasting nuclear monopoly were rudely shattered in 1949 with the explosion of the first Soviet nuclear device. Against a background of intensifying cold war, in 1949 the deployment of the 10,000 mile range of B-36 bomber which had been designed during the darker days of the Second World War as a means of bombing Germany from the continental United States, was approved and with that approval the United States moved to acquire the first truly intercontinental means of delivering nuclear weapons.

As the Korean War buildup of 1950 made larger budgets for nuclear forces available, a rapid expansion in the number of atomic weapons became possible. Between 1950 and 1953, spending for strategic forces increased from \$ 9.6 billion to \$ 43.3 billion, measured in constant 1981 dollars.<sup>8</sup>

In 1949, in accordance with the strategy of 'containment' the OFFTACKLE emergency plan was brown up (later renamed SHAKEDOWN and still later, CROSSPIECE). The underlying strategic concept was, in collaboration with the allies, to impose the war objectives of the United States upon the U.S.S.R.

---

7. *ibid.*

8. Rosenberg, n.3, p.40.

by destroying the Soviet will and capacity to resist, by conducting a strategic offensive in Western Eurasia and a strategic defensive in the Far East.

The plan regarded the future war as a coalition war and contained a detailed list of Soviet allies, U.S. allies and those neutral countries which could be pressured into offering their territories and resources to the Anglo-Saxon powers. The ultimate objective of the war was to accomplish the military defeat of the U.S.S.R. and her satellites to a degree which would enable the United States to accomplish the national objectives outlined in NSC 20/4.

OFFTACKLE envisaged an initial atomic offensive on whose success subsequent developments in the war were to depend. The offensive was to be followed up by extensive conventional operations. The plan proceeded from the assumption that the United States and its allies would be dealing with a Soviet Union lacking nuclear weapons. When the Soviets achieved the capability the Pentagon embarked on more thorough and elaborate preparations for war against the U.S.S.R. The new document compiled in late 1949 was named DROPSHOT.

The DROPSHOT plan was based on the same strategic concept which underlay OFFTACKLE. But it recognised the need to conduct protracted and all-out preparations for war against the Soviet Union which was now a nuclear weapon power. The main

objective of the plan was to secure a ten-to-one superiority over the U.S.S.R. in the number of nuclear weapons and to use this advantage to defeat the Soviet Union and its allies in a nuclear war.

The plan allowed for the use of ground troops to win a 'complete victory'. But land battles were to be fought mostly by U.S. allies. The U.S. effort was to focus on strategic bombing of the U.S.S.R. The Strategic Air Command (SAC) planned to drop, within the first 30 days of the war, 133 atomic bombs on 70 Soviet cities, including eight on Moscow (to destroy some 40 square miles of its downtown area) and seven on Leningrad.<sup>9</sup> This strike was expected to destroy 30 to 40 percent of the Soviet industrial capability, wipe out the oil industry, incapacitate 6,700,000 workers and, according to Air Force Chief of Staff Hoyt S. Vandenberg, it "could well lead to Soviet capitulation and in any event would destroy their overall capability of offensive operations."<sup>10</sup>

Faced with mounting international pressures and growing Soviet capabilities, US planners began to expand and subdivide their list of targets. As stated by Henry Rowen, former Deputy Assistant, Secretary of Defence for International Security

---

9. Genrikh Trofimenko, The U.S. Military Doctrine, Dmitry Belyavsky, trans. (Moscow : Progress Publishers, 1986), p.63.

10. *ibid.*, p. 64

Affairs and a former President of the RAND Corporation, the designated ground zeros were almost entirely:

- (i) industrial facilities,
- (ii) retardation targets, eg; transportation links whose destruction was intended to slow the westward movement of Soviet forces; and
- (iii) counterforce targets, the bases of the small and concentrated Soviet long-range air force.<sup>11</sup>

The three groups of targets were codenamed respectively, BRAVO, ROMEO and DELTA.

From this period until about 1960, both economic and military targets were designated for sizeable attacks.<sup>12</sup> Development of thermonuclear weapons was also authorised, after a major but secret fight within the military-scientific establishment, in the fear that the Soviets would proceed directly from nuclear to thermonuclear development.

Partly because of the developments in Europe and China, this period of effective US nuclear monopoly was also a period of considerable US fear. Although the first wave of deterrence theory had already passed and this period saw the rise of the

---

11. Edgar M. Bottome, The Missile Gap : A Study of the Formation of Military and Political Policy (Fair Leigh : Dickinson University Press, 1975), p. 222.

12. Friedberg, n.5, p.45.



second wave, the body of strategic theory was not still highly developed, nor had it been subjected to a period of searching criticism. With the advent of thermonuclear weapons still several years away, nuclear weapons had not yet come to dominate strategic thinking. The year 1950 saw the preparation of the highly secret National Security Council Paper (NSC)-68, with its evaluation that a worldwide Communist threat existed. While the actual doctrine adopted is unclear, following Stalin's death in 1953 some Soviet military leaders urged that one component of Soviet strategic planning be a strike against US strategic forces before they were launched.

The early 1950s saw the first thermonuclear weapons tested by the United States in November 1952 and by the Soviet Union in August 1953. With those first hydrogen bomb explosions, the stage was set for the new super weapons to begin to dominate strategic thinking.

#### **FORMATIVE YEARS : 1953-1960**

Further economic and military achievements of the Soviet Union, the victory of the revolution in China, the stalemate in Korea, the consolidation of the socialist system in Eastern Europe and the upsurge of the national liberation movement in Asia, Africa and Latin America convinced the U.S. leadership that Truman's strategy of containment aimed at reducing Soviet power and influence was a failure. The Republican administration of

President Eisenhower, who took office in 1953, was to introduce corrections into U.S. foreign policy and strategy.

Where Truman viewed the atomic bomb as a weapon of last resort, Eisenhower viewed it as an integral part of the American arsenal and essentially a weapon of first resort. Shortly after taking office, he began to dismantle Truman's structure for civilian control of the atomic weapons stockpile and to disperse and deploy nuclear weapons, both to reduce stockpile vulnerability and to improve military readiness. By 1961, over 90 per cent of the nation's nuclear weapons were under military control.

Underlying this approach were the numerous evaluations of massive use of nuclear weapons made by the Joint Chiefs of Staff and other military agencies under the Truman administration, including OFFTACKLE, DROPSHOT and other similar plans. The main precepts of the strategy of 'massive retaliation' adopted by the Eisenhower administration were drawn up during the 1951 Congressional hearings of the 'MacArthur case'. General Albert Wedemeyer, a well known figure, said at these hearings that America's strategy should be aimed at 'seizing the strategic initiative' from the enemy and that the United States should respond vigorously at places and with means of its own choosing, including threats to launch an atomic war against the Soviet Union.

'Massive Retaliation' was proclaimed as an official strategy by Secretary of State John Foster Dulles in his speech to the Council of Foreign Relations in New York on January 12, 1954.

By 1954, SAC was preparing to launch a simultaneous, massive, integrated strike against a combination of target systems in the Soviet Union. In order to overwhelm Soviet air Defences, SAC planned to have the entire strike force of upto 735 bombers hit the enemy's early warning screen simultaneously. Targeting categories and priorities set by the JCS were blurred in the interests of getting all the bombers into and out of Soviet air space as quickly as possible. There was no calculated strategy for war winning or termination beyond that of producing as much destruction in Soviet target systems as possible in a single, devastating blow. Increasing emphasis was placed on utilizing high-yield weapons to cause bomb damage and destroy multiple targets simultaneously. This was facilitated by the entry into the American stockpile after the spring of 1954 of readily deliverable fusion weapons with yields ranging as high as fifteen megatons.<sup>13</sup>

In the summer of 1955 the army proposed the creation of a Joint Target Selection and Evaluation Group to replace the joint arrangement in the Air Intelligence Directorate. A joint

---

13. Rosenberg, n.3, pp. 44-45.

staff report that fall, however, concluded that the increasing complexity of target planning made a joint process unworkable and recommended that the JCS formally delegate authority for target selection, consistent with JCS approved criteria, to the unified and specified commands, including SAC. This recommendation was approved by the JCS in November.

In November 1955, the Soviet Union exploded its first true, multi-megaton, thermonuclear bomber. The Soviet achievement greatly reduced the value of partial preemption or Defence. If even a few Soviet bomber armed with the new megaton weapons escaped destruction on the ground and eluded U.S. air Defences, they could inflict unacceptable levels of damage on U.S. cities. The problem of how to maintain an adequate and secure preemptive capability was from this time on a major consideration in shaping U.S. force level and operational planning.<sup>14</sup>

When the advent of ballistic missiles was taken into account, the United States appeared to be confronting a situation of extreme jeopardy. In 1957, the Security Resources Panel of the ODM's Science Advisory Committee prepared a report titled 'Deterrence and Survival in the Nuclear Age' which was briefed to the President on 4 November. It concluded that by 1959, the

---

14. Document 2 in Rosenberg, "A Smoking, Radiating Ruin", pp. 29-38; cited in Rosenberg, n.3, p.47.

U.S.S.R. may be able to launch an attack with ICBMs carrying megaton warheads against which SAC would be almost completely vulnerable. This so-called Gaither Report stressed the need for a better early warning system and recommended acceleration of ballistic missile programs and current active and passive air Defence efforts.

In December 1960, Despite navy criticisms and President Eisenhower's own misgivings, the JCS approved the first STOP as the Nation's nuclear war plan for Fiscal Year 1962. This action effectively ended a period of conflict and opportunity in U.S. nuclear strategy. The STOP concretized, for the indefinite future, patterns of nuclear strategy that had emerged on the basis of operational requirements and the dynamics of operational planning during the preceding fifteen year.<sup>15</sup>

#### THE SEARCH FOR OPTIONS, 1961-1976

At the outset of the decade, roughly coincident with the waning years of the Eisenhower Administration and the first years of the Kennedy Administration, there were signs of a slowly emerging shift in U.S. nuclear strategy. While this shift was not directly the result of evolutionary patterns in strategic thinking, it is clear that U.S. doctrine had begun to respond to the impact of technological modernization in both the United

---

15. *ibid.*, p. 56.

States and the Soviet Union. Starting in the 1960s, the nuclear strategy of flexible Response meant to restore a measure of credibility to the U.S. deterrent in the face of a Soviet capability to inflict unacceptable damage on the U.S. homeland in response to any American attack (whether massive or limited) on Soviet urban-industrial centres. What nuclear strategy confronted was a significant and radical reduction in the time available for the nation to respond to a nuclear attack, and second, that this resulted in an expansion of the potential target classes that could be 'acquired' in a pre-emptive or a retaliatory attack. This turn of events was acknowledged publicly by Defence Secretary Robert McNamara in his University of Michigan address at Ann Arbor on June 16, 1962.

On 16 August 1960, the secretary of Defence, Thomas Gates directed the formation of a full-time Joint Strategic Target Planning Staff (JSTPS) to ensure the coordination of the nuclear targets of all commanders. The JSTPS was to be located at SAC headquarters in Omaha, Nebraska, headed by the SAC Commander. The JSTPS performs two primary functions : the first is to maintain the National Strategic Target List (NSTL), which contains data on all the targets that might be needed to be attacked in a nuclear strike; the second is to prepare the SIOP.

The general policy guidance for the preparation of STOP-62 was contained in two basis documents-National-Strategic

Targeting and attack Policy (NSTAP) and Guidance for the Preparation of the single Integrated Operational Plan for Strategic attack.<sup>16</sup> These directed the JSTPS to prepare a plan that "will provide for the optimum integration of committed forces" against several target categories, including Soviet Strategic nuclear capability as the first priority, followed by "primary military and government control centers of major importance", and then Soviet urban-industrial centers.<sup>17</sup>

The concept of 'optimum mix' had been developed in a study entitled NESC 2009, which had been undertaken by the Net Evaluation Sub Committee (NESC) of the NSC, under the direction of Lt. Gen. Thomas Hickey, in response to an NSC decision of 20 November 1958. The study argued that U.S. targeting policy in the event of a nuclear war should involve a series of 'sequential options', consisting of such target sets as "central strategic systems, theatre threats, and counter-value targets"<sup>18</sup>. It produced a Comprehensive Strategic Target List consisting of a total of 2021 targets, including 121 ICBM sites, 140 air Defence bases, 200 bomber bases, 218 military and governmental control

---

16. Desmond Ball, Deja Vu : The Return to Counter force in the Nixon Administration (California Seminar on Arms Control and Foreign Policy, Santa Monica, Calif, December 1973), pp. 1-11.

17. David Alan Rosenberg, "The Origin of Overkill : Nuclear Weapons and American Strategy, 1945-1960", International Security, 7, no. 4 (Spring, 1983), p.6.

18. Ball, n.16, pp.10-11.

centres, and 124 other military targets (including naval bases and nuclear weapons production facilities and storage sites), with most of the remaining target installations located within 131 urban centers in the Soviet Union and China.<sup>19</sup> In February 1960, President Eisenhower authorized the use of NESC 2009 as guidance for the preparation of all future target lists, and hence it became the basis of the first NSTC and the first SIOP.

### **THE SIOP - 1960**

The SIOP of December 1960 contained only one plan, under which the United States would launch all its strategic nuclear delivery vehicles immediately upon the initiation of nuclear war with the USSR. The single target list predominantly included Soviet, Chinese, and East European cities-whether by virtue of their value as urban-industrial targets or because of the location of numerous military and government control centres as well as air fields and other military bases and facilities, within or on the outskirts of these cities. No strategic reserves were planned, and there was no provision for the preservation of command and control capabilities. Expected Soviet, Chinese, and East European fatalities were estimated by the JCA at 360 to 425 million people.<sup>20</sup>

---

19. Rosenberg, n.17, p. 62.

20. Ball, n.16, p.11.



## THE SIOP 1962 (SIOP-63)

During his last year in office, Dwight Eisenhower seemed to be plagued with unrelenting troubles. Sputnik had greatly enhanced Soviet prestige, and Premier Nikita Khurshchev took advantage of this to expand his nation's influence, especially in West Asia, an area of great sensitivity to the west. America's role as the leader of the NATO alliance, shaken by the 1956 Suez crisis, was being directly challenged by President Charles de Gaulle, who was trying to make France the leader of a European coalition aligned with neither of the superpowers. Latin American hostility toward the United States, once again on the rise after the CIA-engineered coup that overthrew the Guatemalan government in 1954, flared as a result of moves to destabilise Fidel Castro's regime in Cuba. In far-off Southeast Asia, ominous guerrilla warfare troubled Laos and Vietnam. In Africa, The Congo was up in flames. Anti-American rioting in Japan and the humiliation caused by the U-2 affair completed the list of miseries.

The Kennedy administration, which came into office on 20 January 1961, began with a complete rejection of the Eisenhower administration's basic national strategic policy of Massive-Retaliatiion, which it chose to interpret as a wholly inflexible doctrine. One of its first acts was to order the revision of the December 1960 SIOP in order to provide the president with various

options from which he could choose in the event of a nuclear exchange with the Soviet Union.

On 1 March 1961, McNamara assigned a wide range of projects (the so-called 96 Trombones) to the senior Pentagon staff. Two such papers were prepared by Daniel Ellsberg and Lt. Col. Robert P. Lukeman. These were then embodied in the Pentagon's 'Guidelines for Planning', which included a draft-'Policy Guidance on Plans for-central war', which in turn became the basis of the 1961 revision of the SIOP.

The new strategic policy developed under these guidelines had a number of novel features.

- 1) China and the East European countries were separated from the USSR for targeting purposes.
- 2) Soviet strategic forces were separated from Soviet cities on U.S. target list.
- 3) Strategic reserves were to be held by the United States in accordance with the concept of intra-war deterrence.
- 4) U.S. Command and control systems were to be protected to allow controlled response.
- 5) Soviet command and control was to be preserved, at least in the initial stages of any nuclear exchange.<sup>21</sup>

---

21. Rosenberg, n.3, p.63.

The U.S. SIOP was given five options, plus various sub-options, with U.S. attacks against the U.S.S.R. to proceed along the following spectrum:

- 1) Soviet strategic nuclear delivery forces, including missile sites, bomber bases, and submarine tenders;
- 2) Other elements of Soviet military forces and military resources, located away from cities, for example, air Defences covering U.S. bomber routes;
- 3) Soviet military forces and military resources near cities:
- 4) Soviet command and control centers and systems;
- 5) if necessary, all-out urban-industrial attack. Sub-options included use of air/ground-burst weapons, clean/dirty bombs, larger/smaller warheads, civil/Defence evacuation. There was also provision that options (1) and (2) be exercised in a preemptive fashion in response to unequivocal strategic warning of an impending major Sino-Soviet bloc attack on the United States or its allies.<sup>22</sup>

The change was officially adopted in January 1962 after the JCS had studied and approved the strategic change in late 1961. To provide the USSR with the option of fighting a controlled nuclear war, Moscow was specifically separated out

22. *ibid.*

from the other targets on the NSTL in late 1961. In January 1962, McNamara's fiscal year 1963 Defence budget statement revealed, for the first time from an official in public, that the first steps towards the no-cities version of the counterforce strategy were being taken.

The overwhelmingly counterforce character of U.S. strategic nuclear target planning at the end of 1962 is clearly evinced in the Soviet Bloc Target List which was projected for June 1969 as a guide to the development of the SIOP forces through the end of F.Y. 1968. Out of the projected total of 1860 Soviet-bloc targets, only 210 (or 11.3 percent) were urban-industrial, the rest being strategic and theatre nuclear delivery systems, SAM sites and interceptor aircraft bases, command and control centers, and nuclear and chemical/biological weapons production and storage facilities.<sup>23</sup>

The retreat from counterforce/no-cities strategy came soon. Several reasons were assigned to it. First, within the United States there was much criticism of the first-strike implication of the counterforce strategy; second, the Soviets denied the possibility of controlled counterforce warfare; third, there was an unfavourable reaction of West European allies; and fourth, there were bureaucratic hurdles.

---

23. *ibid.*, pp. 66-67.

Early in 1963, McNamara began to refute those who insisted that the nation could survive a nuclear war. In a speech before New York's exclusive Economic club, he contended that such a conflict would be 'highly destructive to both sides' under all foreseeable circumstances. Two years later in testimony given before Congress, he pointed out that even if the government spent an astronomical \$ 25 billion to protect the civilian population, "no foreseeable Defence programme within the assumed cost restraints could reduce fatalities to a level much below 80 million."<sup>24</sup>

In January 1964, more than a year after the Cuban missile crisis, McNamara spelt out the Defence Department's latest nuclear strategy. It was based on the assumption that the development in the Soviet Union of a survivable second strike force made it impossible for the United States to develop a first strike capability, and that even an elaborate civil Defence programme could not reduce fatalities in a first strike much below eighty million

From this McNamara concluded that a strategy that emphasised deterrence but included certain 'damage limiting' characteristics appeared to be "the most practical and effective course for us to follow." However, in the event that the

---

24. Quoted in Gerard H. Clarfield and William M. Wieck, Nuclear America, (New York : Harper and Row, 1984), p. 258.

deterrent failed and a nuclear exchange actually did take place, the United States should be in a position to limit damage to its populations and industrial capacities. In practical terms it meant that the United States would have to include on its list of potential targets military installations as well as population centres inside the Soviet bloc.<sup>25</sup>

McNamara called the first element of the new strategy 'mutually assured destruction' (MAD) and defined it as "the capability to destroy the aggressor as a viable society, even after a well-planned and executed surprise attack on our forces". The second aspect, which he was at pains to emphasise was of far less overall importance, he called 'damage limitation' i.e., the capability to reduce the impact of the enemy attack by both offensive and defensive measures and "to provide a degree of protection for the population against the effects of nuclear detonations".

In 1964 McNamara concluded that there was a clear conflict between one side's purpose of limiting damage and the other side's purpose of maintaining a capacity for assured destruction. If one side could always achieve assured destruction, the other could not achieve satisfactory damage limitation. In a long secret paper dated December 3, 1964 he wrote to President Johnson, "Our damage limiting problem is their

---

25. *ibid.*, p. 259.

assured destruction problem and our assured destruction problem is their damage limiting problem." He went on to argue that there was no combination of damage limiting measures that could not be overcome by the Soviet Union.<sup>26</sup>

So McNamara believed that the criterion of 'damage limitation' could not be met, and assured destruction became his single decisive standard for the measurement of what and how much weaponry was required. He applied that standard in a highly conservative way, using worst-case assumptions about future Soviet capabilities. For example, when he chose to have 1,000 Minuteman missiles, he was choosing a number that Congress would find acceptably large, not a number that he himself could demonstrate as strategically necessary.

#### **FROM SIOP-63 TO SIOP-5**

The current U.S. targeting policy has a direct historical lineage to the beginning of the Nixon administration, when the first substantive moves were made to review the 1962 SIOP. On 21 January 1969, the day after the inauguration, the new President's national security advisor, Henry Kissinger, issued National Security Study Memorandum (NSSM)3 titled 'Military Posture' which directed a review of the U.S. military

---

26. Mc George Bundy, Danger And Survival : Choices about the Bomb in the First Fifty Years, (New Delhi : Affiliated East-West Press Pvt. Ltd., 1989), p. 547.

posture and asked for the development of criteria against which U.S. strategic needs could be measured.

In April 1970, it was reported that the development of alternatives to the policy of Assured Destruction was regarded as a top priority within the NSC and that a coordinated governmental review of the subject was under way. In mid-1972 several groups with the task of development of additional strategic nuclear war options were formed. The work of these groups led directly to National Security Study Memorandum (NSSM) 169, approved by President Nixon in late 1973. And NSSM-169 led directly to the promulgation of National Security Decision Memorandum (NSDM) 242, signed by President Nixon on 17 January 1974. The memorandum directed that further plans for limited employment options which enable the United States to conduct selected nuclear operations be developed and formally incorporated into the SIOP. A notable aspect of the memorandum was the notion of targeting those Soviet assets that would be critical to Soviet postwar recovery and power.

NSDM-242 introduced the notions of 'withholds' or 'non-targets', that is, assets that would be preserved from destruction. Some of these, such as population per se have now been exempted absolutely from targeting; others, such as the centres of political leadership and control, are exempted only for the purpose of intra-war deterrence and intra-war bargaining,



and strategic reserve forces (SRF) are to be maintained to allow their eventual destruction if necessary.<sup>27</sup> Finally, NSDM-242 authorized the Secretary of Defence to promulgate the 'Policy Guidance for the Employment of Nuclear Weapons' and the associated Nuclear Weapons Employment Policy (NUWEP), signed by Secretary James Schlesinger on 4 April 1974 and subsequently known as NUWEP-I. The first SIOP prepared under the new guidelines was SIOP-5, which was formally approved in December 1975 and took effect on 1 January 1976.

It is clear that by 1974 some very basic changes in America's nuclear strategy were being implemented. The latest approach to nuclear war, Schlesinger explained, was intended to reduce the possibility for uncontrolled escalation while attacking meaningful targets with a sufficient accuracy-yield combination to destroy only the intended targets and to avoid wide-spread collateral damage. The new strategy was intended to be flexible, taking into account a wide array of potential dangers ranging from a limited Soviet first strike to an accidental launch.

The Schlesinger doctrine was intended to provide the President with a range of nuclear options in the event of Soviet aggression in order to reduce chances for an uncontrolled escalation to all-out nuclear war by creating the possibility of

---

27. Rosenberg, n.3, p.71.

fighting a limited one. But in developing the new strategy, Kissinger and Schlesinger inevitably lowered the threshold for the use of nuclear weapons while ignoring the warnings of those who believed that once nuclear weapons were introduced onto the battlefield, an all-out exchange would become inevitable.<sup>28</sup>

#### SIOP-5 TO SIOP-6

The advent of President Jimmy Carter's Democratic administration in January 1977 introduced nothing essentially new into the US military-political doctrine or strategy. A thorough evaluation of the US-Soviet strategic balance carried out in Presidential Review Memorandum NO.10 (June 1977) demonstrated the stability of this balance, and again confirmed the conclusion that there would be no winner in a US-Soviet nuclear conflict.

In fact when President Carter arrived at the White House, he gave the impression, publicly and privately, of being so determined to undo the existing framework of nuclear weapons policy that many believed NSDM-242 and the Schlesinger NUWEP would be scrapped. But far from it, within two years Carter had prepared five new Presidential Directives on nuclear war plans—Numbers 18, 41, 53, 58, and 59. Not only the Schlesinger flexible option 'counterforce' policy was used as a starting point, but the number and categories of SIOP options were also increased.

---

28. Clarfield and Wiecek, n.24, pp. 309-310.

The continued reliance on NSDM-242 and NUWEP-1 was encoded in Presidential Decision (PD)18 which was issued by President Carter on 24 August, 1977.

The new doctrine was named the Countervailing Strategy in an effort to set it apart from the many past efforts at refining nuclear policy in the name of deterrence. The new strategy, said its promoter, Defence Secretary Harold Brown, would assure that no potential adversary of the United States or its allies could ever conclude that aggression would be worth the costs that would be incurred. The Carter doctrine was billed in the media as a new strategy for nuclear war, but as Brown persistently pointed out, it was only an evolutionary stage in the 35-year development of the US strategic deterrent.

The 'countervailing strategy' was codified by the US President in Presidential Directive 59 (PD-59) which he signed on July 25, 1980. PD-59 was only a few pages long but it did three main things to the Schlesinger SIOP. First, it shifted some of the emphasis from economic targets onto military targets, particularly Soviet political and leadership targets and military command and control targets. Second, it did away with the arbitrary Schlesinger objective of being able to destroy 70 percent of the Soviet industrial base. Third, it required instead that the US forces be able to endure a protracted nuclear war, one which might last perhaps months instead of the few days

imagined under the older doctrines that incorporated massive, or 'spasm' responses to a Soviet attack.

By the time PD-59 leaked to the Press in the summer of 1980, SIOP-5 had been through four regular revisions, each tagged with a letter starting with A, and each containing more potential targets and refinements than the one before. The 1980 war plan-SIOP-5D-included an astronomical 40,000 potential targets. This in spite of the fact that a realistic and empirical estimate would make a total of less than four thousand targets.<sup>29</sup>

A clue to the staggering figure of 40,000 targets appeared in Defence Department testimony to the Senate Armed Services Committee in March 1980 when SIOP-5D was enforced. The evidence shows the extraordinarily comprehensive nature of the targeting process. First, the targets are divided into four principal groups. These groups in 1980 contained no urban centres. They were Soviet nuclear forces, the general purpose military forces, the Soviet military and political leadership centres, and the Soviet economic and industrial base. Examples of targets in each principal group were listed by the Pentagon as follows:

(1) Soviet nuclear forces:

ICBMs and IRBMs, together with their launch facilities

---

29. Peter Pringle and William Arkin, SIOP : Nuclear War From the Inside (London : Sphere Books, 1983), p.143.

(LFs) and launch command centres (LCCs), nuclear weapons storage sites, airfields supporting nuclear-capable aircraft, nuclear missile firing submarine (SSBN) bases.

(2) Conventional military forces:

Casernes, supply depots, marshalling points, conventional air fields, ammunition storage facilities and tank and vehicle storage yards.

(3) Military and Political Leadership:

Command posts, key communication facilities.

(4) Economic and Industrial targets:

- a) War-supporting industry, ammunition factories, tank and armoured personnel carrier factories, petroleum refineries, railway yards and repair facilities.
- b) Industry that contributes to economic recovery, coal, basic steel, aluminium, cement and electric power.<sup>30</sup>

Target 'sets' from these principal groups are allocated in four general attack options available to the President ; Major Attack Options (MAOs), Selected Attack Options (SAOs); Limited Attack Options, (LAOs), designed to permit the selective destruction of fixed enemy military or industrial targets; and Regional Nuclear options (RNOs), intended to destroy the leading elements of an attacking enemy force. Significantly, the SIOP

---

30. *ibid.*, p.144.

always left the President with two special attack categories, one for preemptive attacks on the Soviet Union and another for the Launch-on-Warning (Low), or Launch-under-Attack (LUA), which means an all-out retaliation on the warning of a nuclear attack or an actual attack. There were reserve, or 'withhold' targets, which would not be attacked in any of the four options unless specified. These include Soviet population centres and national command and control centres. In addition, because the SIOP is a contingency plan for general nuclear war, it also includes targets in other communist countries. There are thousands of targets in the formerly Warsaw Pact nations, China, Cuba, Vietnam, and even some targets in unspecified allied and neutral territory.<sup>31</sup>

A new part of PD-59 was the war-fighting capability. It required the US nuclear forces to be able to endure exchanges of nuclear weapons and maintain a high level of control over a number of different responses and strikes. To accomplish this, two things were required-upgrading the nuclear forces and upgrading the C<sup>3</sup>I (command, control, and communication) machinery. The new weapons included the Trident submarine, with its more accurate and longer range missile; MX and Cruise missiles. These weapons were required to have targeting packages which could be changed quickly according to the requirements of a war.

---

31. *ibid.*, pp. 144-145.

The C<sup>3</sup>I would need more survivability and flexibility. Existing command posts and communications would be hardened and made mobile. A complete range of new 'attack assessment' and 'post strike' reconnaissance and signals intelligence (SIGINT) systems would be required, to increase the ability of the National command authority to identify the nature of attacks, choose the most appropriate responses and gauge their effectiveness.<sup>32</sup>

Although it is true that Jimmy Carter laid the foundations of Ronald Reagan's even more aggressive policy toward the Soviet Union, the Carter strategic team was always careful not to say they thought nuclear wars were winnable and never to say that PD-59 required the US to be able to fight and win a nuclear war. It was emphasised that "PD-59 does not assume that the United States can win a limited nuclear war, nor does it intend or pretend to enable the US to do so. It does seek both to ensure that the United States could prevent the Soviets from being able to win such a war and, most critical, to convince them in advance that they could not win."<sup>33</sup>

## **RONALD REAGAN ERA**

In January 1981 President Ronald Reagan was sworn in as the President. One of the key planks of the Republican election

32. *ibid.*, pp. 146-147.

33. *ibid.*, p. 152.

platform was the promise to restore America's military might so as to be able to talk to the USSR and to US allies from positions of strength. During the Presidential election of 1980, the 'Window Of Vulnerability' of American intercontinental missiles (ICBMs) was frequently emphasised. Ronald Reagan made repeated assertions that the window would soon be so wide open that "the Russians could just take us with a phone call". However, the fact was that the American land-based Strategic weapons contained about 9000 warheads in 1983 while the Soviet Union had about 7000 by 1985. About 3200 American warheads could be fired from submarines which were totally invulnerable; the corresponding figure for the Soviet Union was only about 150 warheads. Thus, in secure retaliatory capacity the US was 20 times superior to the Soviet Union.<sup>34</sup>

Still, a new review of targeting policy was begun by the Reagan Administration in the spring of 1981, under the general direction of Fred Ikle. In order to improve the integration of Nuclear Weapons Employment Policy with other elements of U.S. strategic nuclear policy, the Reagan Administration produced a 'Nuclear Weapons Employment and Acquisition Master Plan'. This was followed, in October 1981, by National Security Decision Directive (NSDD) 13, prepared as a successor to PD-59. Finally, in July 1982, Secretary of Defence Casper Weinberger issued a new

---

34. Kosta Tsipis, "Extreme Wrong on the Extreme Right", Bulletin of the Atomic Scientists, 38 :4 (April, 1982), p.4.



NUWEP, designated NUWEP-82. The guidance contained in these documents was then used to develop a new SIOP, in which priority was accorded to the requirements of nuclear weapons employment in a situation of prolonged or protracted nuclear conflict.<sup>35</sup> This new SIOP, formally designated SIOP-6, took effect on 1 October 1983.

Now the U.S. target plans for strategic nuclear war are extremely comprehensive. SIOP-6 includes around fifty thousand potential target installations, as compared to about twenty-five thousand in 1974 when NUWEP-1 was promulgated and the development of SIOP-5 initiated.

Thus, it can be stated that the nuclear policy of the United States was planned essentially to achieve the following ends:

- (1) To secure a position of relative counterforce superiority for the United States which would enable it to maintain 'extended deterrence' of the USSR- in other words, to have a free hand in military operations at local and regional levels and rely on 'escalation dominance' in case of a direct US -Soviet conflict involving nuclear missiles.

---

35. Robert Scheer, With Enough Schovels : Reagan, Bush, and Nuclear War (New York, Random House, 1982), p.2.

- (2) To enhance US readiness and capacity for real war-fighting, especially protracted regional operations, at a level lower than that of all-out nuclear war. With this end in view and within the framework of the 'direct confrontation' strategy, the Pentagon adopted, in 1982, a new, "Airland Battle" concept. It contains basic guidelines for operations by general purpose forces and envisages preemptive strikes deep into the enemy's rear, integrated use of all types of weapons, if need be, nuclear and chemical. A purely aggressive concept has thus been introduced into the theory and practice of U.S. and NATO war preparations.
- (3) To draw the Soviet Union into a new round of the arms race that focuses on qualitative improvements of weapons systems. An important aspect of this is the SDI programme.
- (4) To create an additional background of strength for American diplomacy and secure new 'Bargaining Chips' at arms reduction talks.

## CONCLUSION

Targeting in the U.S. war plans has remained remarkably resilient from the late 1950s through to the most recent version of the SIOP. The targets have consisted of the Soviet strategic forces, the Soviet conventional forces, the urban-industrial structure, and the Soviet military and political leadership

centres. Two developments, however, are notable. One is that the number of potential target installations in the war plans has increased enormously, from a National Strategic Target Data Base (NSTDB) of 4100 in 1960, of which the JSTPS selected out 2600 for attack in the first SIOP, to some 50,000 in the NSTDB that supports SIOP-6. Second, these targets have been increasingly divided into a large array of 'packages' of varying sizes and characteristics, providing the National Command Authorities (NCA) with 'customized' options for an extremely wide spectrum of possible contingencies.

## CHAPTER THREE

## Chapter Three

### BRITISH AND FRENCH NUCLEAR TARGETING

NATO was established in 1949 and within five years it committed itself to a general strategic plan that relied primarily on the use, or threat of use, of American nuclear weapons in Defence of Western Europe to deter Soviet aggression. In December 1957, however NATO held its unprecedented heads-of-government summit meeting in an atmosphere of crisis. For the previous five years NATO's strategic plans had become increasingly dependent on strategic nuclear retaliation in response to any Warsaw Pact aggression. Yet, neither Europeans nor Americans were now confident that such dependence could be an adequate deterrent. This crisis of confidence increasingly dominated NATO deliberations over the next several years.<sup>1</sup>

The Europeans, on the one hand, worried that the United States would not execute strategic retaliation in response to aggression against Western Europe; for Washington to do so would be suicidal. On the other hand, they worried about what would happen if the United States did execute a strategic retaliation in response to aggression against Western Europe, because that could provoke Soviet retaliation against the entire NATO

---

1. Robert Endicott Osgood, NATO : The Entangling Alliance (Chicago : University of Chicago Press, 1962), pp.145-46

alliance; the Europeans would have had no influence on a decision that would destroy them.

The Americans dismissed these fears as a manifestation of European schizophrenia. However, to hold both fears simultaneously was not necessarily a sign of irrationality. Besides, different West European countries held different views. Therefore, what appeared to be an internally inconsistent 'West European' view was often simply a collection of conflicting national views.

In case of Britain, by 1957 it had become the world's third nuclear weapon power, and NATO's second. In 1954 the British, along with the rest of the world, first learned of the American detonation of a fusion device, around fifteen months after the event. Dismayed at America's obsessive secrecy, and envious of the destructive potential and military implications of thermonuclear weapons, Churchill and his aides came to an almost immediate decision to proceed with a British hydrogen bomb project.<sup>2</sup>

During the next few years Britain's reliance on thermonuclear weapons became a justification for an across-the-board cutback in other military expenditures. The 1957 White

---

2. Andrew J. Pierre, Nuclear Politics : The British Experience with an Independent Strategic Force, 1939-1970 (London : Oxford University, 1972), pp. 89-94.

Paper on Defence presented by Defence Secretary Duncan Sandys which proposed this cutback, was hardly revolutionary in its adoption of deterrence through massive retaliation. On the other hand, Sandy's explicit reliance on an independent national nuclear arsenal as a deterrent drew approving notice in Paris and further stimulated German interest in access to nuclear weapons.<sup>3</sup>

To replace the Sandys strategy, some critics endorsed the doctrine of 'graduated deterrence'. As elaborated by Sir Anthony W. Buzzard, such a policy would deliberately distinguish between tactical nuclear responses to aggression, in which low-yield atomic weapons would be used against military targets, and strategic nuclear responses, which would involve high-yield (thermonuclear) attacks on enemy cities. As a deterrent against less-than-all-out local aggression, NATO would threaten tactical nuclear retaliation; if enemy aggression continued unabated, then the alliance could threaten strategic nuclear responses. Since tactical nuclear responses would not necessarily compel enemy retaliation against western cities-in fact, they might give the enemy incentives to avoid escalation to counter-city strikes-the tactical nuclear threat would appear to be more credible and hence better able to deter aggression in a wide range of contingencies.<sup>4</sup>

---

3. David N. Schwartz, NATO's Nuclear Dilemmas (Washington D.C. : The Brookings Institution, 1983), p. 48.

4. *ibid.*, p. 50.

The most serious drawback in this doctrine was that it did not clearly specify whether graduated deterrence was primarily a doctrine that the United States should adopt to strengthen its guarantee to the west, or a doctrine that Britain should adopt to make its own deterrent more credible or a doctrine that required nuclear forces controlled by a centralized NATO command in order to function.

The French lack of confidence in the American nuclear guarantee grew over the years. The events leading upto France's decision to develop its own nuclear weapons began in the early 1930s, with the growth of a sophisticated nuclear scientific community within France. Its leader, Joliot-Curie, pioneered French fission research and when World War II broke out some French scientists who had left Germany and France became involved in the British atomic effort and thus found their way to Canada which became the venue of a portion of the British programme.

After the liberation of France, the French atomic energy efforts was revived under the leadership of Joliot-Curie. A heated public and private debate erupted in France between 1954 over whether France should develop its own nuclear weapons. Among several arguments General Pierre Gallois' stand out for their forcefulness and influence.

Gallois' argument rested on two related points. He argued that the countries which possess nuclear weapons become



vulnerable to nuclear assaults from the enemy countries and in case of an actual attack it can do little to extend the deterrence to its allies. The second argument emphasised that since nuclear offensive forces are likely to become increasingly invulnerable and hence unattractive targets for strategic retaliation, deterrence rests on the counter-city potential of a nation's nuclear arsenal.

Apart from the strategic rationale, political constituencies favoured French nuclear independence for six reasons:

- (1) Nuclear weapons were a symbol of national prestige in the international community.
- (2) They would provide France with greater leverage and input into the evolution of western strategy.
- (3) With respect to other issues, possession of nuclear weapons would provide France with political leverage.
- (4) Nuclear weapons would reverse the trend toward Anglo-American domination of NATO.
- (5) They would boost the morale of a French officer corps shattered by the experience of Dien Bien Phu.
- (6) They would give France a greater voice in the increasingly prestigious arms-control discussions between East and West.<sup>5</sup>

---

5. George Kelly, "The Political Background of the French A. Bomb", Orbis, Vol. 4 (Fall 1960), p. 292.

The nuclear debate in France was influenced in no small way by its general position within the alliance. After the Second World War, French political and military planners identified two future threats to French security : The Soviet Union and West Germany. Throughout the later 1940s, as the western Europeans began to seriously consider plans for ensuring their security, France insisted on plans that took both potential threats into account. The Dunkirk Treaty of 1947 was directed against both the Soviet Union and Germany and only because of American and Belgian intervention did the Brussels Pact of 1948, which established the Western European Union, avoid including anti-German language in its text.<sup>6</sup>

So by 1957 France finally embarked on its own nuclear weapons program, justified in part by vocal claims that the U.S. nuclear guarantee could not be counted on, and fed by resentment over the subordinate role allegedly forced on it by the Anglo-Saxon domination of the alliance.

#### BRITISH NUCLEAR TARGETING :

The priorities for British nuclear targeting are perfectly clear although the details are shrouded in secrecy. Recent debates on the future of the British nuclear force have revealed an official preoccupation with the quality rather than

---

6. David N. Schwartz, NATO's Nuclear Dilemmas (Washington D.C., The Brookings Institution, 1983), p. 41.

the quantity of targets threatened. The actual mechanisms of British targeting, however, have not been discussed at all, so much so that one senior official explained : "I think it has been the preference of Governments to allow them (the Soviet Union) to draw their own conclusions rather than to describe precisely what our plans and capability would be in terms of targeting policy".<sup>7</sup>

During World War II the choice of appropriate targets for the bomber offensive was an extremely controversial topic. The argument was won by those in the Royal Air Force (RAF) Bomber Command who claimed that the most decisive contribution that air power could make to the war was to attack directly the German civilian population. The consequent damage to enemy morale would undermine the readiness to continue the war. Alternative strategies were dismissed as "panaceas". The limited achievement of this strategy became the subject of a vigorous postwar debate.<sup>8</sup> The arrival of the atomic bomb changed everything the strategic air power moved to the center stage. As Michael Howard recalled : "All the old targets which had competed for attention-

---

7. Michael Quinlau, deputy under secretary of state (Policy and Programmes), in House of Commons, Strategic Nuclear Weapons Policy, Fourth Report from the Defence Committee, Session 1980-81, p.106, Quoted in Desmond Ball and Jeffrey Richelson (ed.), Strategic Nuclear Targeting (Ithaca and London, Cornell University Press, 1986), p.109.

8. Sir Charles Webster and Noble Frankland, Strategic-Air offensive against Germany, 4 vols., London, Her Majesty's Stationary office, 1961 ; Quoted in Desmond Ball and Jeffrey Richelson (ed.), p.110.

oil, transportation, heavy industry, civilian morale-could be shattered in a single attack."<sup>9</sup>

The first consideration of possible British requirements of atomic bombs produced by the Chiefs of Staff on New Year's Day 1946 suggested that a "stock in the order of hundreds rather than the scores" of bombs would be needed to attack an enemy with "widely dispersed industries and populations." That summer, the chiefs' Joint Technical Warfare Committee, again with city bombing most in mind, concurred with the view that "several hundred bombs" might be required to bring about the 'collapse' of Russia. In July 1947 a Defence Research Policy Committee put the requirement up to 1,000 bombs, but this turned out to have been based on a superficial calculation. Having been informed that the Home Defence Committee believed that twenty-five atom bombs would be needed to knock out Britain, the Research Policy Committee observed that the geographical area "we have in mind" (the USSR was still not officially designated as a potential enemy) was forty times that of the United Kingdom. Thus  $25 \times 40 = 1,000$ .<sup>10</sup>

By 1947 the chiefs had already stated their assumption that the "knowledge that we possessed weapons of mass destruction

---

9. Michael Howard, "Bombing and the Bomb", in Studies in War and Peace (London, Maurice Temple Smith, 1970), pp.145-146.

10. Margaret Gowing, Independence and Deterrence: Britain and Atomic Energy, 1945-1952, vol. 1 : Policy Making (London : Macmillan, 1974), pp.169, 170, 175, 188, 189.

and were prepared to use them would be the most effective deterrent to war itself." In the 1948 review of atomic energy requirements, a minimum number of two hundred bombs by 1957 was designated as the British requirement. This figure was based on a belief that six hundred bombs would be needed by that date as a total strategic requirement, and that it could be expected that two-thirds or four hundred would be met from the American stockpile.

It should also be recognised that the basic drive behind the British programme was the need to have capability to produce atomic bombs rather than a specific military concept. To the extent that there was a plan, it was already clear to the British that their prospective nuclear capability was best understood as an adjunct to that of the United States rather than as a basis for standing alone against Soviet aggression. They therefore did not have to plan to attack all relevant Soviet targets - just those the Americans could not manage. But this presumption was being made on the basis of a complete lack of knowledge of future American stockpiles and plans.<sup>11</sup>

Aware of this obvious gap in their knowledge, the British Chiefs of Staff, from early 1949 on, made repeated requests to the Americans for discussions on the subject: but

---

11. Desmond Ball and Jeffrey Richelson, ed., Strategic Nuclear Targeting (Ithaca and London : Cornell University Press, 1986), p.111.

the Americans always refused. It was not until January 1952 that Winston Churchill, was given a personal briefing by the U.S. Air Force and told as much about the strategic Air Plan as had been told to Secretary of State Dean Acheson. By the end of that year the chiefs had received their own briefing on a "highly personal basis".

Britain spent much of 1952 in crystallising its ideas on nuclear planning and management. The exercise was difficult as no worthwhile information flowed from the United States. However, there was an awareness that nuclear targeting was much more than preparations for 'burning and blasting cities'. Besides, a wide variety of bombs needed to be developed, some of which could serve tactical purposes in an eventuality. Added to it was the assumption that the United States was developing a stockpile which would be adequate to decimate most of the 'key' Soviet targets. The need, therefore, was to clearly define the role to be played by British forces in case a nuclear war broke out.

The Chiefs of Staff prepared in the summer of 1952 a 'Global Strategy Document' which provided a rationale for the British nuclear force. It was realised that the United States had to be taken as the key deterrent. There were however, targets which were not directly of strategic interest to the United States, and it was here that the British nuclear force

could be utilised. Above all, for the British to have no part in "the main deterrent in the cold war and the only Allied offensive in a World War would seriously weaken British influence on United States policy and planning in the cold war and in war would mean that the united Kingdom would have no claim to any share in the policy or planning of the offensive".<sup>12</sup>

The 1950s were spent in discussing the coincidence and variance of American and British strategic interests. Such an analysis was essential as Winston Churchill said in 1955: "We cannot be sure that in any emergency the resources of other powers would be planned exactly as we would wish or that the targets which we would wish or that the targets which would threaten us most would be given what we consider the necessary priority in the first few hours. These targets might be of such cardinal importance that it could really be a matter of life and death for us".<sup>13</sup> The induction of the first TV-16 Badger medium-range bomber into the Soviet Air Force in 1954 signaled the development of a direct soviet threat to Britain thereby enhancing the British fears even more.<sup>14</sup>

---

12. Quoted in Gowing, n.10, p.441.

13. Quoted in Ball and Richelson, n.11, p.113.

14. Robert P. Berman and John C. Baker, Soviet Strategic Forces : Requirements and Responses (Washington, D.C., Brookings Institution, 1982), p.45.

Britain tested its first thermonuclear weapon in May 1957 and by the end of 1958 it had acquired a significant nuclear capability. The direct threat to the Soviet Union now gave Britain a degree of manoeuvrability. This was acknowledged in the Defence White Paper of 1958.

But here tension in the British nuclear policy developed. The White Paper of 1958 spoke of NATO strategy being "based on the frank recognition that a full-scale Soviet attack could not be repelled without resort to a massive nuclear bombardment of the sources of power in Russia".<sup>15</sup> But the question here was that if Britain were to take part in a joint attack with the United States, would the country be assigned different sorts of targets than those that would make sense if Britain were acting alone?.

A significant development took place with the amendment of the Atomic Energy Act in 1954 by the American Congress. The amendment permitted the government to share the data with allies on the external characteristics of nuclear weapons. Two bilateral agreements were signed between Britain and United States in June, 1955. They facilitated an exchange of information on the military aspects of atomic energy, including Defence planning and training in operational use of nuclear weapons. According to Andrew

---

15. Report on Defence : Britain's contribution to Peace and Security, 1958, cited in Ball and Richelson, N.11, p.14.



Brookes, "This close liaison led to the first combined targeting plan between the two air forces since the combined bomber offensive of 1949."<sup>16</sup>

In November 1957 members of the Strategic Air-Command (SAC) visited the headquarters of the Bomber Command at High Wycombe "to discuss joint operational planning, targeting and other problems of common interest, with the object of coordinating nuclear strike plans to their mutual advantage."<sup>17</sup> By this time however, SAC was well past needing any help in destroying most centres of Soviet population. By then the so-called retardation targets, that is, those directly related to halting a soviet conventional attack on Western Europe, had been taken over by the U.S. tactical air forces. So again the doubts over the coincidence of US and British priorities surfaced. For Britain, Soviet theatre systems would be a higher priority. If, however, Britain was expecting to act alone, then a counterforce attack would have been inappropriate as, acting on its own, Britain could barely have made a dent in Soviet nuclear capabilities.<sup>18</sup>

The V-Bombers being closer to the Soviet Union than the

---

16. Andrew Brookes, V-Force : The History of Britain's Airforce Deterrent (London : Jane's, 1982), pp.80-81.

17. Stewart Menaul, Countdown : Britain's Strategic Nuclear Forces (London : Robert Hale, 1980) p.91.

18. Ball and Richelson, n.11, p.116.

aircraft of U.S. Strategic Air Command by almost five hours, the Bomber Command was expected to strike first in the event of a combined attack on the USSR. Given that the V-bombers would be the first to strike, it would have been logical to aim the counterforce targets-the submarine bases and medium-range bomber and missile sites-which threatened Britain most. However, if the aim was to pave the way for SAC, then the most rational targets would have been Soviet air Defences. A compromise was struck on the basic plan and an initial strike on a range of military targets was to be followed by a substantial reserve force able to attack the centres of Soviet population if need be.

In the early 1960s, this approach may have seemed perfectly feasible. However, this concept was soon undermined by a series of developments, like the removal of 60 liquid-fueled Thor missiles in 1963, and the grounding of the Valiant Bombers due to metal fatigue in 1964, which led to a swift decline of the Bomber Command. One reason for the quick rundown of the force was the need to recycle nuclear materials from aircraft bombs to missile warheads.

In the later half of the sixties Polaris had taken over from Bomber Command. The move to Polaris provided an important bonus in both survivability and penetrability but an inevitable drop in target coverage. At its peak in 1963-64 the Bomber Command's V-Bombers could have certainly found a significant

proportion of their assigned targets. Besides, most bombers would have been available at any given time. With Polaris, the overall numbers fell by about two-thirds; further, not all boats could be expected to be on patrol at any given time. Air Vice-Marshal Stewart Menaul argues that to produce a submarine force equivalent to the Bomber Command in 1962 (i.e., 170 V-Bombers and 60 Thors) would have required "at least twenty submarines".<sup>19</sup> This was not exactly the alternative. In 1962, the Thors were already scheduled to be phased out and the real comparison was with 100 Skybolts. Taking into account the problems of the Polaris patrols, there was clearly a marked decline in the number of deliverable warheads and therefore target coverage during the 1960s.<sup>20</sup>

This development <sup>a</sup>ris<sub>A</sub>ed the issue of priorities. The worry was not only on account of the decline in ability to attack from two hundred targets to sixteen, but also the fact that there was every chance of the submarine giving away its position at the missile launch.

December 1962 saw the signing of the Anglo-American Nassau Agreement. Following the agreement there was a shift in the British plan. In 1963, the Commander-in-Chief directed the Bomber command to attack the targets assigned to it by Supreme Allied Commander in Europe (SACEUR). This was in contrast to the

---

19. Menaul, n.17, p.117.

British plan of attacking the targets fixed by the British chief of staff. The new plan was ratified on 23 May 1963.

Since then targets for first the V-Bombers and then the Polaris flotilla have been allocated by the Joint Strategic Target Planning Staff (JSTPS) at the U.S. Strategic Air Command in Omaha, Nebraska. A European team, including some British officers (normally around three), participates in the planning. Operational plans are formulated by the Nuclear-Activities Branch at SHAPE. The basic targeting plan is the Nuclear Operation Plan (NOP; formerly called the General Strike Plan), which is developed by SACEUR "for the execution of nuclear strikes with the nuclear weapons under his command." This would involve use of British nuclear-capable aircraft, such as Buccaneers, Jaguars, and Tornados, as well as Polaris.

According to Desmond Ball, NATO planning provides for both selective use and general nuclear response, for which the British strategic forces would be most useful. The objectives of general nuclear response would be "to conduct, in concert with external forces, operations to neutralise enemy capability, destroying his ability and will to wage war, disrupt his command and control, and destroy his land, naval and air forces, including logistic support elements". These targets are divided

---

20. Ball and Richelson, n.11, p.18.

into a Priority Strike Programme and a Tactical Strike Programme. The full execution of the NOP would probably occur only in conjunction with the execution of the U.S. Single Integrated Operational Plan (SIOP). Most of the targets mentioned are military-related, what once would have been described as "retardation" in nature.<sup>21</sup>

The switchover to the Polaris system implied that the British nuclear strength was suitable mainly for countervalue retaliations and therefore it should be kept in reserve till the nuclear war escalates.

There have been separate British plans worked out in the Whitehall. These were the responsibility of the Naval Department working with the Defence Intelligence Staff. In 1985, nuclear targeting was made the responsibility of the Nuclear Policy Directorate, headed by a civilian under the Deputy Under Secretary (Policy).

There are two important studies on the range of targeting options available to Britain. The first consists of two Adelphi Papers by Geoffrey Kemp, produced in 1974, which look in great detail at the targeting requirements for medium-range

---

21. Desmond Ball, "Targeting for Strategic Deterrence" Adelphi Paper No. 185 (London: International Institute for Strategic Studies, Summer 1983), p.16.

nuclear powers.<sup>22</sup> In his analysis Kemp concentrates on countervalue targeting, identifying four damage levels: the top ten Soviet cities, excluding those protected by the Moscow ABM system, the top ten cities, including Moscow and Gorki : the top fifty cities and the top two hundred cities. A later study by Ian Smart looked specifically at the British force. Smart reaches a conclusion similar to Kemp's, but by a simpler method.

The British government has placed a high premium on being able to attack Moscow. The issue got prominence in the late 1960s with the development of the Galosh Defences around Moscow. By 1968 it seemed likely that only the Moscow area was to be defended. Having decided that Moscow was essential as a target, it became apparent that a range of missiles would have to be committed to be sure of destroying the target. The situation eased in 1979-80 when the Galosh system was reduced from sixty-four to thirty-two launchers, but the Moscow criterion would still limit the flexibility of British targeting.<sup>23</sup>

---

22. Geoffrey Kemp underlines choices. For example if the goal is to inflict highest proportion of damage on the Soviet population then Moscow would not be a judicious choice on account of the ABM Defences around Moscow.

Ian Smart categorises targets as soft, semi-hard and hard. He argues that there is a complete spectrum of targets which includes sensitive ones like ABM or air Defence early warning and control radars, hydro-electric or thermal generating stations, naval ports, military air fields etc.

23. Ball and Richelson, n.11, p.122.

Chevaline (the new front end for Polaris which consists of two manoeuvring clusters of real warheads and decoys, capable of penetrating the Moscow Defences), became operational in the summer of 1982. It enlarged the targeting option to a few targets which included Moscow.

The arrival of the MIRVed Trident missiles as replacements for Polaris in the 1990s means greater targeting flexibility. The Trident will not only give Britain additional warheads but also an extra nip to pierce the Soviet Defences. This makes the British deterrent more authentic.

Recently, doubts have been expressed that the Soviet leadership would be deterred by a capability which has little chance of hitting the key targets. Therefore more attention ought to be paid on command and control centres. Concentration on these centres covers many cities including Moscow, and so could not significantly reduce the human consequences. Destroying such targets can have a major impact on Soviet military strength.

However, the question still remains regarding the relationship between national nuclear plans and NATO plans, and whether or not Britain is presumed to be "standing alone" or acting in concert with the United States. The conclusion within government is not known. At any rate, despite the assignment of Britain's nuclear forces to NATO, the assumptions and dominant plans surrounding their targeting do not naturally fit in with

any of the NATO plans.

The trend in British public pronouncements suggests that the "standing alone" hypothesis is the underlying rationale for the nuclear force. If this is the presumption then the requirements for the deterrent may not be too great. The objective would be to dissuade the Soviet Union from launching an attack on Britain. For Britain, therefore, a truly "last resort" deterrent might be no more than that required to threaten some real, but not necessarily overwhelming, hurt to the Soviet Union.

The main benefit of the U.K. nuclear force for NATO might be not so much in attacking certain targets for the alliance but in preserving the national territory as a sanctuary, in serving as the major American base close to the battle.

There are certain issues not yet fully resolved. Until the 1980s the trend had been clear. Despite the assignment of forces to NATO in 1962, Britain had been forced, because of the reduction of available warheads, to concentrate on maintaining a threat to Moscow, the major source of Soviet power. In the future, more widespread, flexible, and selective targeting will be possible. This extra flexibility and scope, however, were not sought and seem to have been acquired without any clear sense of how they should be employed. <sup>24</sup>

---

24. Ball and Richelson, n.11, p.126.



## FRENCH NUCLEAR TARGETING

Like the British, the French had long been engaged in nuclear research. Unlike the British, however, the French had to halt their efforts during World War II. Not until the early fifties did French strategists begin to speculate about the enormous implications of nuclear weapons for modern warfare. Although the French were relative parvenus to the stage of atomic strategy, they managed to grasp much earlier than most others, including the small band of strategic writers in the United States, the political potential derived from ownership of nuclear weaponry. It was this early recognition of the political value as well as the military utility of nuclear weapons that served as the main prod to the French nuclear programme.

Reflecting upon the experience in World War II, French military writers discerned in the evolution of twentieth century warfare the progressive dominance of firepower on the battle field. In war fighting, atomic weapons obviously loomed superior to conventional arms for destroying large military targets or for striking against a massive ground invasion. Soon came the recognition in France of the strategic role of nuclear weapons as the instrument of retaliation against the enemy's homeland. Here too, the French perception represented an extension of the wartime experience, particularly of the role of strategic bombing in World War II, and it coincided with the American shift to a strategy of massive retaliation.

Yet, the French were among the first in Europe to understand the psychological dimensions of deterrence and to embrace the conviction that nuclear weapons, in order to dissuade a potential aggressor, need not be addressed solely to defined military targets. Instead, the French believed, the psychological value of nuclear weapons lay in their awesomeness and in the ambiguity of their use. As the debate in France over the desirability of a French nuclear arsenal gathered momentum in the early fifties, French experts argued that nuclear force meant political leverage as the symbol of great power status and international prestige.

This concept both spurred and shaped the direction of the French nuclear weapons programme under President de Gaulle, who carried the argument to its logical conclusion. Nuclear weapons, contended de Gaulle, represented more than instruments of twentieth century deterrence and Defence; as the ultimate weapon, they represented ultimate power and the accreditation of that power on the international stage.

The fundamental thrust of the French Nuclear-Targeting is proportional deterrence, though current doctrine has introduced economic and administrative targets within the original anti-cities framework. The technical credibility of The French deterrent largely depends on a benign strategic environment-notably, minimal Soviet ballistic missile Defences.

Britain and France seem to be in a similar strategic situation, which explains the similarity in their strategic employment policies. However, the scenarios of nuclear operations described by French sources reveal a lower threshold than both Britain and the United States.

#### SOURCES ON FRENCH POLICY

The most important primary sources on French nuclear targeting are speeches, articles, and interviews by the President of the republic, the Prime Minister, the Defence Minister, and the Chief of Staff of the armed forces. In France, such statements usually derive from a bureaucratic process conducted with care. Additional primary sources that are sometimes even more detailed and informative than such high level declaration are occasional articles published by Defence Ministry officials in the quasi-official monthly journal Defence Nationale.

Secondary sources include a number of academic studies, unofficial strategic analyses, and legislative documents. While very few academic studies have looked closely at operational and targeting considerations, several provide useful background on the history of the French nuclear weapons programs. Of the unofficial strategic analyses, few are more important than those written by Gen. Lucien Poirier, the leading theorist of the Centre de Prospective et-d' Evaluations during the late 1960s and the drafter of the documents that furnished the basis for the

still-valid 1972 White Paper. While France's Senate and National Assembly have very minimal roles in the formulation of Defence policy<sup>25</sup> and essentially no role at all in a nuclear targeting, some rapporteurs of parliamentary committees have prepared valuable studies. The most useful of these remains the Tourrain Report, prepared in 1980 by Gaullist politician Raymond Tourrain on the basis of numerous interviews and apparently with access to classified information.<sup>26</sup>

### PROPORTIONAL DETERRENCE AND ITS IMPLEMENTATION

France's entire current strategic nuclear forces were planned during General Charles de Gaulle's presidency (1958-69). Therefore it was inevitable that the choice of targeting objectives would be immensely influenced by his strategic notions. The second important influence was ironically the technical constraints imposed by the operational limitations of the first strategic nuclear means. Its role means of delivering nuclear weapons to the USSR from 1964 to 1971 consisted of Mirage IV bombers. Each carried (and still carries) only a single sixty-kiloton bomb, and can only strike targets in the USSR with in-flight refueling on the way to and from missions.

---

25. David S. Yost, "French Defence Budgeting : Executive Dominance and Resource Constraints", Orbis 23 (Fall 1979), pp.893-897.

26. David S. Yost, "French Nuclear Targeting", in Desmond Ball and Jeffrey Richelson, ed., Strategic Nuclear Targeting (Ithaca and London : Cornell University Press, 1986), p.128, 129.

Since only 62 Mirage IVs were delivered between 1964 and 1968, General de Gaulle had little choice but to aim at Soviet population centres as a deterrent.

During the course of his Press conference on 23rd July, 1964, General de Gaulle announced a doctrine that holds valid till date. This was in the backdrop of the first Mirage IV bombers becoming operational. He declared, "The path of deterrence is henceforth open to us, for the act of attacking France would be equivalent for any aggressor to undergoing frightful destruction himself".<sup>27</sup>

Proportional deterrent theory, or the "deterrence by the weak of the strong" (la dissuasion du faible au fort), holds that France's threat of nuclear retaliation can deter the Soviet Union because the damage France could cause by targeting Soviet cities exceeds what the USSR would stand to gain in conquering or destroying France. This capability must be obtained and maintained if France is to avoid the status of a U.S. protectorate. Dependence on the U.S. guarantee would be strategically unwise as well as politically humiliating since the United States is judged unlikely to honour its commitments in trying moments. The centre de prospective et d'Évaluations of the Defence Ministry also in the late 1960s prepared an elaborate theoretical Defence of the "proportional - deterrence" concept.

---

27. De Gaulle's Press conference of 23 rd July, 1964, Quoted in n.26, p.129.

Proportional deterrence has thus been the fundamental concept of French strategic nuclear planning since the beginning. Officially propounded theories of proportional deterrence stress the disproportions between (a) French vital interests and Soviet marginal interests and (b) the advantages the USSR might gain in conquering or destroying France and the losses it might suffer from French retaliation against Soviet cities. Although Raymond Aron and other critics of proportional deterrence have emphasized the disproportion between the damage France could cause in the USSR and the residual Soviet capability to retaliate against France<sup>28</sup>, countless official statements defend the concept. According to President Valery Giscard d'Estaing, France's strategic nuclear forces have created "an almost unprecedented disparity between what an aggressor stands to gain and what he risks losing as a result of his aggression."<sup>29</sup>

One of the main features of proportional deterrence was its anticity orientation to cause a certain number of Soviet casualties. In 1970, according to the official estimates, French anticity targeting could cause 14 to 18 million Soviet deaths even if only half of the weapons were delivered.<sup>30</sup> A realistic

---

28. Raymond Aron, The Great Debate : Theories of Nuclear Strategy, Ernst Pawel, trans. (New York : Doubleday, 1965), pp.100-143.

29. Quoted in Yost, n.26, p.131.

30. Cited in Yost, n.26, p.131.

estimate of current French capabilities might be a capacity to cause 20 million Soviet fatalities.<sup>31</sup>

### **CURRENT STRATEGIC TARGETING DOCTRINE**

The year 1980 saw major refinements in the French strategic targeting policy. There was a shift from the earlier policy of targeting population centres to the destruction of the Soviet economic infrastructure and administration. There has been partial explanations for this change. As early as March 1977, Gen. Guy Mery, who was then Chief of Staff of the armed forces, suggested that Soviet civil Defence programmes could weaken France's anti-cities deterrent power. This observation was seconded the following year by a high official in the Defence Ministry's planning department, who referred favourably to the possibility of targeting economic assets view of the uncertainties created by Soviet civil Defence.<sup>32</sup> The decision to adopt a new declaratory policy was probably made in 1979.

In January 1980, Colonel Lewin announced that although Soviet civil Defence programs could not be fully effective in providing the populace protection against French nuclear strikes, in the future France would threaten damage in addition to high numbers of fatalities in an anti-cities strike.

---

31. *ibid*

32. *ibid.*, p.132.

In a later article in 1980, Lewin introduced a term that has gained currency over the years-'oeuvres vives'. The oeuvres vives of a ship constitute all that is contained by the hull below the water line, the ship's 'vital works' of propulsion and supply. The term also implies that the ship could well sink if struck below the water line. In introducing the term, Lewin suggested that French adoption of this targeting concept reflected the opportunity offered by prospective deployment of the multiple warhead, M-4 SLBM in addition to responding to Soviet civil Defence programs:

"The response is undoubtedly to be sought in the multiplication of targets and selectivity, the aim being to reduce to nothing the structures and the vital works'(oeuvres vives) of the adversary state, even if part of the population of the objectives targeted escapes destruction. Thus one differentiates between an 'anticities' strategy and a strictly 'anti-demographic' strategy. This strategy will without doubt lead to obtaining an important number of medium-yield warheads, preferred over megaton yields. In this respect the M-4 program constitutes a remarkable increase in the value of our nuclear armament".<sup>33</sup>

The shift in the French policy is therefore referred to

---

33. Lewin, "L' avenir des forces nucleaires Franca-ises", Defense Nationale, May 1980, pp.17-18, cited in Yost, n.26, p.132.



as 'an enlarged anticities strategy. The strategic nature of the policy has not changed but it has become more complete and operational.

President Francois Mitterand has continued the refinement of the French policy. Defence Minister Charles Hernu has stated that Mitterand's strategic force modernization decisions (all of which had been planned under Giscard d'Estaing) do "not imply any change in our anticities strategy, corollary of deterrence of the strong by the weak".<sup>34</sup>

The actual carrying out of the deterrent threats depends much on factors like survivability, penetrability, reliability, and accuracy of weapons and delivery systems. Besides, there should be a sound network of command, control and communication systems. In case of France, the survivability criterion assumes greater importance as it is widely feared that its Mirage IV bombers, the IRBMs, and the SSBNs in port are all vulnerable to a Soviet first strike. If the fears come true then France will be left only with SSBNs at sea which will be grossly inadequate to meet the soviet onslaught.

In contrast to the past emphasis on achieving certain level of fatalities, the new oeuvres vives or enlarged anticities doctrine seems to depend on a sufficiency criterion of

---

34. Quoted in Yost, n.26, p.133.

numbers of cities. The principle seems to be that France's surviving SLBM warheads alone-after a Soviet first strike-should be able to strike a number of major Soviet cities at least equal to the number of major French cities.

In the long term, in contrast to the inflexible anti-cities strategic targeting policy that has to be reconfirmed, the French may be drawn to consider more flexible targeting plans in response to improving Soviet capacities for long-range conventional and nuclear discriminate strike options against France, for example, coordinated counterforce strikes with accurate, low-yield nuclear weapons or conventional explosives.<sup>35</sup> Soviet preemptive destruction of part of France's nuclear arsenal in this fashion would highlight the "all or nothing" dilemmas of an anti-cities strategy. If the French acknowledge this, they may have to recognise that cooperation and coordination with their allies in nuclear targeting would be desirable for deterrence as well as for operational employment and would not necessarily deprive them of decision making autonomy in any ultimate scene.

## CONCLUSION

The strategic Views of the British and the French are a blend of their perceptions of the threat, of the credibility of

---

35. Yost, n.26, p.133.

A similar functional role is the options their strategic nuclear forces may offer in an uncertain future. Increased U.S. unreliability, the end of the Atlantic alliance, its restructuring, or other events may give the independent strategic nuclear forces more credible missions in changed international contexts. Indeed, while the British frequently affirm their confidence in U.S. reliability, the French almost as regularly deny that the United States can be trusted to honour its guarantee to western Europe. This is a prime justification for France's independent deterrent. However, France's continued membership in the Atlantic alliance and her security diplomacy regarding the maintenance of the U.S. presence in Western Europe and in West Germany in particular illustrate France's prudence and realism.

This prudence and realism are appropriate in view of the probability that any attempt to sustain sanctuarization through tactical nuclear employment and the threat of strategic strikes in an East-West war would fail, and given that the benefits of any successful sanctuarization would be meagre and transient. Proportional deterrence theory would probably become irrelevant the moment the USSR came to see the destruction (or, more likely) the conquest of France as a vital war aim. Actually executing the anti-cities or oeuvres vives threat by striking the USSR could guarantee France's more total defeat through Soviet nuclear retaliation, a harsher Soviet occupation regime, or both. Gen.

Guy Mery, Chief of Staff of the armed forces during 1975-80, implicitly acknowledged in 1976 the limited deterrent effectiveness of French nuclear forces in such circumstances by expressing doubt "in an extreme case when every thing in Europe had collapsed about us, the national will would remain to have recourse to the threat of massive destruction, even to assure our survival".<sup>36</sup>

The French nuclear deterrent threats are most likely to be efficacious in the least challenging strategic contingencies. France's anti-cities threat is most likely to deter the USSR from doing what it has only marginal or zero interest in doing—for example, striking French cities with nuclear weapons with no provocation. Proportional deterrence would be least likely to guarantee France's security and independence in the circumstances where that security and independence would be most severely threatened—in a more general and intense East-West war, in which the USSR might well find it a vital aim to destroy certain targets in France or to conquer France. The French emphasis on the primacy of deterrence and war prevention, therefore, parallels that of the Atlantic alliance as a whole.<sup>37</sup>

---

36. Quoted in Yost, n.26, p.155.

37. Yost, n. 26, p. 156.

## CHAPTER FOUR

## Chapter-Four

### SOVIET NUCLEAR TARGETING

In the case of the United States, it is relatively easy to discern the general trends in the evolution of nuclear thinking and planning but for the Soviet Union, this task is not as facile, for the Soviet Union historically has been concerned with the preservation of sensitive information.

The first issue of the Soviet nuclear strategy is the milieu within which it developed. While the advent of the long-range nuclear missile altered Soviet military doctrine and strategy, both military tradition—largely shaped by the Ground Forces — and geographic and political reality have continued to have a strong influence in determining Soviet wartime objectives and operational philosophy. Probably the most influential factor is Russia's position as a large continental nation separated from powerful neighbors by long and relatively accessible borders. The vulnerability of its western border has been impressed on modern Soviet thinking by the devastating German invasion of June 1941. And the presence of potential threats along both its eastern and western borders has fostered Soviet concern about the possibility of a two-front war. A perhaps less direct influence on Soviet strategic policy and strategy is the USSR's technological and industrial capacity for production of strategic weapons.

In Soviet military writing the terms 'military doctrine' and 'military strategy' are used more precisely than in the West. Military doctrine, the highest level of military thinking, is dictated by the Communist Party leadership as a set of official views about the types of warfare for which the Soviet military establishment must be prepared. Subordinate to the Soviet doctrine are various levels of military thought, including military strategy, which develops the detailed organization, methods, and, preparations for waging war.

### **THE NUCLEAR STRATEGIES OF THE SOVIET UNION**

The essence of Soviet thinking appears to be single-minded concern with the military rationale behind nuclear strategy. For the Soviet Union, the use of nuclear weapons is an event that will occur only in the most catastrophic of struggles, i.e., in the well-known phraseology of the final clash between socialism and capitalism.

According to V.D. Sokolovsky, Marshal of the Soviet Union war, including nuclear war, will be fought as suddenly and violently as possible with the central objective of destroying the forces of the enemy. Marshal Nikolai Ogarkov, formerly Chief of Staff of Soviet armed forces, argues that nuclear war has never been tested. But to keep such a war limited will not be logically possible. Inevitably such a war will extend to all out war.

Until Stalin's death in 1953, Soviet military doctrine and strategy were based solely on the experience of the Pre-nuclear age.<sup>1</sup> After 1953, a reevaluation that went on for several years which resulted in the Soviet proclamation that a 'revolution in military affairs' had occurred. The basis of this transformation was the advent of long-range ballistic missiles armed with nuclear warheads, which offered the unprecedented capability to destroy targets around the world within a short time. The USSR adopted a new doctrine based on the belief that war between socialism and capitalism was no longer inevitable, but that a war between the two opposing coalitions of states would inevitably become a nuclear missile war and would result in the crushing defeat of the imperialists.

One important implication of the change in the nature of war was the possibility that massed nuclear strikes could accomplish strategic objectives at the outset of a war by their timely destruction of enemy targets.<sup>2</sup> Long-range nuclear weapons also helped to erase the distinction in earlier Soviet strategy between the priority of front-line operations, where the enemy's armed forces were directly engaged, and the belief that attacks

- 
1. Raymond L. Garthoff, *Soviet Strategy in the Nuclear Age* (New York : Praeger, 1958), pp. 61-63.
  2. Col. Gen. Nikolai A. Lomov, "The Influence of Soviet-Military Doctrine on the Development of Military Art", in William R. Kintner and Harriet Fast Scott, ed. and trans., *The Nuclear Revolution In Soviet Military Affairs*, (Oklahoma : Universit Oklahoma Press, 1968), pp. 160-161.



on the rear area targets that supported the war effort would have a negligible impact on the course of the war. With the advent of nuclear armed missiles, Soviet military strategy shifted to emphasize the importance of simultaneously attacking the enemy's front line and his economic and national control systems.

Although official doctrine relegated the traditionally predominant Ground Forces to a secondary role of exploiting nuclear strikes by the Strategic Rocket Forces, Soviet military writings have continually emphasized that final victory can be achieved only by the combined efforts of all branches of the Soviet armed forces.<sup>3</sup>

Another traditional military priority that continues to be honoured is the importance attributed to strategic reserve forces. The USSR learned in World war II that its strategic reserves were essential as a hedge against uncertainty and to assure the supreme High Command that certain designated forces would always be available to be brought into battle at decisive points. While the nature of Soviet military forces has changed since that time, the principles governing their utility in wartime have not.

The Soviet military posture therefore represents a compromise between the old and the new in terms of military

---

3. V.D.Sokolovskii: Soviet Military Strategy, (London : Macdonald and Jane's, 1975), pp. 193,252.

strategy as well as force structure. The balance leans heavily toward the modern nuclear side of the equation, but traditional Soviet military forces retain an important role.

## WARTIME OBJECTIVES

The main Soviet military objectives in a world war have probably always been Defence of the homeland, defeat and neutralization of military adversaries, and seizure and occupation of vital contiguous areas. The existence of modern strategic forces has altered both the nature and the relative priority of these objectives. Contemporary Soviet military strategy appears to focus on occupying Western Europe while relying on strategic forces to either politically, or militarily offset the United States and any regional threats to its security such as China.

Europe is undoubtedly the most important theatre of military operations for the Soviet Union. Soviet military writings suggest war in Europe could begin solely with conventional and nuclear forces and occur either simultaneously with intercontinental nuclear strikes or proceed at first only regionally. In any set of circumstances, defeat of the enemy's military forces and occupation of important territories would remain the wartime objectives. Soviet military strategy therefore attempts to integrate nuclear and non-nuclear responses at the tactical, regional and inter-continental levels of combat.

The USSR's plans for the wartime occupation of Europe suggest that its nuclear strikes would be discriminate in their targeting. This is consistent with the Soviet all-arms approach that integrates the operations of tactical non-nuclear forces with those of regional nuclear strike forces.

The most important of the Soviet Union's intercontinental strategic objectives in wartime would be to deter the use of U.S. nuclear forces. Failing that, Soviet military writings suggest the American threat would be countered by deep nuclear strikes at military and non-military targets that would so devastate the United States that it could no longer influence the course of war. Soviet strategy would aim at destroying U.S. strategic nuclear assets, command and control centres, general military forces, and administratives and economic centres. This element of Soviet strategy reflects both the high priority the USSR puts on a centralised command system and the Soviet view of nuclear war as a conflict waged between apposing political systems.

#### **SOVIET NUCLEAR TARGETING STRATEGY**

Whereas the prevalent U.S. concept of strategic nuclear operations is limited to intercontinental exchanges, the Soviet concept of strategic operations begins at the USSR's borders. In the Soviet view, "the theatre of military operations (TVD) is defined as the land or sea area within the limits of which armed

forces during war execute a single strategic mission." 4

To the Soviets, NATO probably represents at least three, and probably four, TVDs (one or two in central Europe and one on each of the north and south flanks) for the conduct of strategic nuclear operations. China, Japan, Korea, and Okinawa probably constitute another TVD (or two).

Finally, there is the transoceanic TVD, the United States and its military bases in the Atlantic and Pacific basins. Each of these TVDs is equally 'strategic', although the central European, TVDs may be first among equals in Soviet strategic, force and resource planning. The Soviets have deployed, and continue to deploy, four basic types of strategic weapon systems for strategic nuclear operations in all of the prospective TVDs : intermediate and medium range ballistic (IR) MRBMs), submarine launched ballistic missiles (SLBMs), medium and heavy bombers and ICBMs. In the Soviet scheme of things, all these strategic weapons systems are equally strategic. Moreover, Soviet ICBMs and SLBMs are employed against targets in all TVDS, not just in the transoceanic theatre.

Certain general factors affecting the conduct of strategic nuclear operations in the TVDs are stated in Soviet

---

4. Quoted in William T. Lee, "Soviet Nuclear Targeting Strategy", in Desmond Ball and Jeffrey Richelson, ed., Strategic Nuclear Targeting (Ithaca and London: Cornell University Press, 1986), p.88.

literature Although these factors apply to all TVDs, variations probably exist because (1) the Soviets recognise the differences in the target arrays found in each TVD, and (2) Soviet politico-military objectives vary somewhat among the prospective TVDs. The principal factors governing the application of targeting strategy to each TVD appear to be (1) the political objectives set by the Soviet political leaders ; (2) the nature and objectives of planned Soviet military operations in each theatre; (3) the requirement to limit collateral damage to population, industry, and urban infrastructure commensurate with achieving military objectives; and (4) the choice of the most vulnerable components of the targets to be attacked.<sup>5</sup>

In planning attacks on industrial target arrays, Col. M. Shirokov stresses analysis of the regional distribution of industry and inter industry relationships; the destruction of plants and facilities engaged in the production of missiles, nuclear weapons, and other modern weapons ; and determination of the "quantity of forces and means required for the obstruction of the target and the capabilities of the enemy to rebuild".<sup>6</sup> He adds that destruction of one or two key branches of transportation may be sufficient to sap or 'significantly weaken' a country's military potential.

---

5. *ibid.*, p. 88.

6. Quoted in Ball and Richelson, ed., n.5, p.89.

In general, Shirokov considers the following economic activities to be the most lucrative targets in terms of prohibiting the enemy from replacing the nuclear delivery systems, nuclear weapons, and other military assets to be destroyed as first-priority targets : transportation, power stations, facilities producing liquid fuels, chemical industries, and selected bottleneck facilities in other industries. Targeting these activities also limits enemy capabilities to employ surviving military forces effectively.

In the discussions on how to conduct nuclear war and target nuclear weapons, the Soviets conspicuously do not consider population and cities valid targets on political, military, and moral grounds. Rather, they consider such targeting concepts as Mutual Assured Destruction to be yet another manifestation of the evils of imperialism. However, this does not mean that the Soviets would not target some population groups, such as business and government elites-the 'ruling groups' who are the 'class enemy' - and possibly selected concentrations of 'scientific-technical personnel' as well. But any targeting of selected population groups evidently would meet specific political and military-industrial criteria and would not be extended to the general population, whom the Soviets prefer to preserve if possible.<sup>7</sup>

---

7. *ibid.*, p.91.

## POSSIBLE VARIATIONS IN TARGETING STRATEGY

Just as individual TVDs present different target arrays, Soviet politico-military objectives are not uniform for every TVD. In the European TVDs, Soviet objectives are clear : to defeat and disarm NATO forces and occupy Western Europe in as intact a form as possible. The Soviets want to limit collateral damage to Western Europe for several reasons. Politically, they wish to bring their version of social progress to Western Europe in the wake of the next war, just as Eastern Europe was 'liberated' after World War II. The Soviets continue to express their belief that the next war will be the grave of capitalistic democracies everywhere and usher in the era of world 'socialism'. However, they also believe that they can achieve the same objective without nuclear war and would much prefer to do so.

There are two very practical considerations guiding Soviet nuclear targeting in the European TVDs. First, it is very much in the Soviet interest to target selectively, avoiding 'overkill' with large weapons in order to limit fallout, not only on Eastern Europe and the Soviet Union but also on the Soviet-Warsaw pact occupation forces. Second, the Soviets could make good use of Europe's economic resources during the course of military operations, thereby helping to rebuild their own resources in the aftermath of a nuclear war.

In the Far East, Soviet objectives would be more complex. They might wish to occupy sparsely populated regions outside the Great Wall, and possibly Manchuria, but they probably consider it quite infeasible to occupy China proper, where population density would support a 'peoples' war'. In the latter area, the Soviets probably would use strategic nuclear forces to disarm the country and to destroy sufficient industrial and transportation facilities to insure that China would not become a threat-nuclear or otherwise-to the Soviet Union for some time. against Japan, on the other hand, Soviet targeting might be much more selective because Japan, like Europe, could contribute to Soviet post attack recovery.

Finally, there is the question of the 'Transoceanic' TVD. All the known evidence explicitly or implicitly indicates that Soviet nuclear targeting strategy for the United States is the same as for other TVDs. On the other hand, since the Soviets have no ambition to occupy the United States, they must seek not only to destroy its existing military forces at the beginning of the war but also to prevent it from reconstituting those forces. Hence, Soviet targeting of industry might be more extensive in the United States than in Europe. In all TVDs, however, Soviet literature indicates that Soviet nuclear targeting would be selective with regard both to the targets attacked and to the degree of damage inflicted.<sup>8</sup>

---

8. *ibid.*, p.93.



## CONCLUSIONS

Soviet nuclear targeting strategy is consistent with the Soviet objective to fight and 'win' a nuclear war. This strategy rejects all the premises of U.S. Assured Destruction targeting and most of the premises of U.S. 'counter-value' targeting strategies.

Soviet nuclear targeting has changed little since it was formulated around 1950. The strategy applies to all TVDs although there may be some variations in its execution, in particular TVDs depending upon the scenario and the decisions of the top Soviet political leadership.

Soviet strategic missile forces have been sized to the requirements of the targeting strategy with due allowance for scenario uncertainties and the requirement for a large secure reserve. The forces necessary to achieve Soviet targeting objectives in the Eurasian TVDs were deployed by the mid - 1960s. but because of the large number of hard targets in the continental United States, the Soviets were not able to field the necessary forces for the transoceanic TVD until the mid-1980s.

The Soviets negotiated the SALT I and SALT II ceilings on their strategic missile forces to accommodate their targeting requirements. Any reductions in these force levels which the Soviets are likely to agree to will depend on the availability of technology that will reduce Soviet force requirements for high-

confidence achievement of their targeting objectives, or changes in targeting requirements due to reductions in the size of the target arrays, or the degree of protection provided by hardening, or some combination of these factors.

The Soviets are not likely to agree to any force level for their strategic missile forces in START that will endanger their capabilities to achieve their targeting objectives in all TVDs while also maintaining a large secure reserve force except, perhaps, in return for a total ban on deployment of ballistic missile Defences developed under President Reagan's Strategic Defence Initiative.

## CONCLUSION

## CONCLUSION

Today the world stands in the midst of momentous changes. With the end of the cold war and dismantling of the Warsaw Treaty Organisation, peace appears to be finally within reach. But one should desist from such simplistic conclusions. The fact remains that the United States and the Soviet Union alone presently possess the equivalent of more than 8 billion tons of TNT in their strategic arsenals. This vast destructive potential, shared in approximate balance by the two superpower, is the equivalent of 640,000 times the explosive power of the Hiroshima atomic bomb.

It has been estimated that 400 megatons (a mere 5 per cent of the total arsenal) dropped on urban and industrial targets in the Soviet Union would destroy two-thirds of the USSR's urban population and three-quarters of its industry. even greater devastation would result if 400 megatons were dropped on the United States. Infact 97 per cent of the total nuclear stockpile still exists. Similarly, elaborate war plans continue to be churned out by the strategists and theorists in the east and more so in the west.

The basic differences that separate Soviet strategy from that of the United States mainly reflect dissimilarities between the Soviet and American strategic cultures, not any inherent incapacity on one side or the other to appreciate military logic.

In general, the Soviets have shown little attraction to the 'intellectual baggage' that has been so intimately associated with the US Defence planning in the postwar years.

Apparently the objectives of Soviet and American strategic nuclear policy are similar, yet each country has pursued different policies based on differing assumptions regarding the deployment and targeting postures, and the controllability of nuclear war. After the initial confusion and incoherence, from the early 1960s, the overriding objective of United States strategic nuclear policy has been the development of a strategic posture designed to enable the United States to control any nuclear exchange in order to limit damage at the lowest possible levels while ensuring that the outcomes are favourable to the United States. The notion of controlled response, which was developed by the Kennedy administration in 1961-62 and which governed the design of SIOP-63 has been by and large retained and refined by successive administration. The central theme has been that the limitation of damage in nuclear war can best be achieved by controlling escalation so as to terminate any nuclear exchange at the lowest possible level, and as per as possible, to give the Soviet Union every incentive to avoid escalation to major urban-industrial attack targets.

There is no corresponding parallel in Soviet strategic thinking and nuclear war-planning. On the contrary, Soviet Strategic planners believe that the best approach to limiting

damage to the Soviet Union is the rapid and wholesale destruction of the ability of the United States and its allies to wage nuclear war.

Unlike America's, the Soviet view of deterrence involves neither the notion of assured destruction or unacceptable damage, nor that of limited or controlled nuclear options. Rather, deterrence of nuclear attacks is best achieved by the ability to wage a nuclear war successfully. In other words, the better the Soviet forces are equipped and prepared to fight a nuclear war, the more effective they will be as a deterrent to a nuclear attack on the Soviet Union. And in the event of a failure of that deterrence, these forces will then be used purposefully and massively for military victory.

The Soviets dismiss the western concepts of demonstration attacks, limited nuclear war options and slow-motion counterforce duels. They find such ideas questionable and lacking in credibility because they would have to rely on the chance that the aggressors will be prudent and will impose certain limits on the use of nuclear weapons.

The debate about British policy towards strategic nuclear deterrence has been more or less continuous since 1954. Many argue that, firstly, the possession of nuclear weapons is not only ethically wrong, but it also makes Britain even more vulnerable to attack than she would be if she did not possess them. Secondly, the time is past when Britain's power and

interests | required a strategic nuclear capability in support or as a manifestation of the role that she should seek to play in the Atlantic alliance. Thirdly, that given her restricted resources it would be better for Britain to employ the skills and money she has to enhance her conventional forces, rather than to divert them to maintain a marginal increment to the nuclear strength of the United States.

These arguments, however, have been vigorously cut down by experts who express doubts about America's willingness to provide an active extended deterrence in case of a nuclear attack on the European mainland. Fundamentally, both Britain and France developed nuclear forces:

(i) because of a determination, in the earliest post-war periods, not to abandon a capability they had developed as pioneers in the field:

(ii) as a precaution against radical change in the diplomatic alignments between East and West in Europe; and

(iii) to retain their distinctive attributes as major powers, at a time when other attributes like colonial possessions, were being cut away.

Britain's capability, in terms of number of weapons, stayed at the originally conceived level, even though the two super-powers were beginning to develop large and increasingly

diversified nuclear armouries. Later, the French nuclear forces, though they became more diversified than the British, followed a British pattern of assessment in assuming that a relatively small nuclear armoury was sufficient to achieve national objectives.

Therefore, for both Britain and France, the capability needed to maintain a credible mutual deterrence is relatively small. Both states have been able to take into account the parallel threat that the United States must always pose to the Soviet Union, but they have never set the objective of crippling the Soviet Union's industrial-military power, which has been the US aim in planning its forces. No wonder then that the British and French policies suggest a very conservative analysis of their requirements.

From French pronouncements, an adversary can gain a relatively clear impression of French intentions. But where Britain is concerned, even the impression of intent is unclear. France chose to neglect specific obligations inherent in the North Atlantic Alliance and based her posture upon national and state priorities. Yet she remains a member of the Alliance and in all probability her decisions would be compatible with those of NATO in times of crisis. In case of Britain, her forces are committed to NATO and the involvement in the Alliance is heavily stressed. Therefore Britain as compared to France has lesser maneuverability.

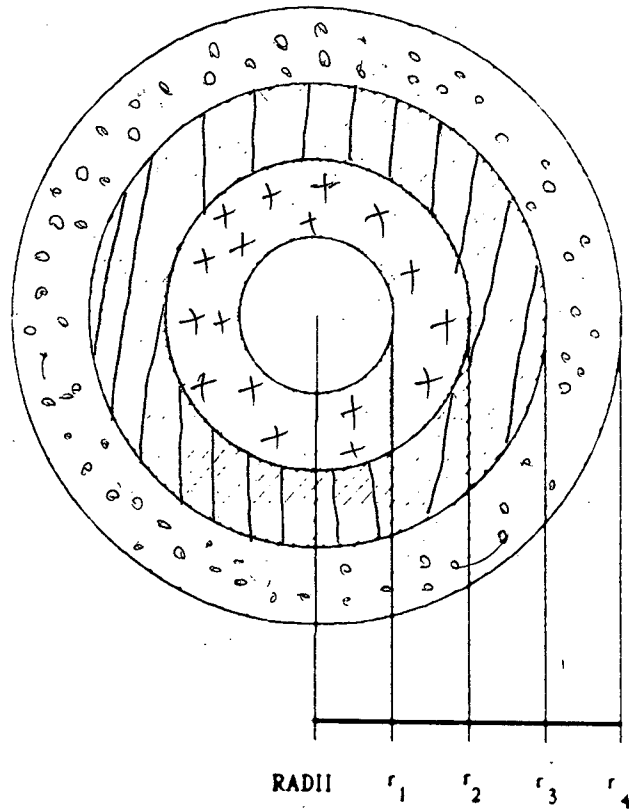


The Ottawa declaration has recognised, since 1974, the contribution of the strategic forces of France and Britain to the overall deterrent position of the Alliance. In this perspective, the destruction of one or more medium powers in western Europe could appear rather costly to a potential aggressor. Besides, the geographical position of France offers access to the Atlantic, airport facilities, communication lines, oil pipelines etc., without which it would be impossible to control a war even for a few days.





One would wish to conclude on a happy and optimistic note, especially when rapid changes are taking place in the lives of men all around. Yet, like the fallen hero of a Greek tragedy, mankind totters under the spectre of his own tragic flaws. No doubt he is great but he somehow lacks the decisiveness to banish the monster he himself had created more than forty years ago.

**APPENDIX**

Figure 1  
Areas of Damage



AREAS

- |       |   |                                      |
|-------|---|--------------------------------------|
| $r_1$ |  | 15% of weapon area - 100% fatalities |
| $r_2$ |  | 20% of weapon area - 50% fatalities  |
| $r_3$ |  | 20% of weapon area - 25% fatalities  |
| $r_4$ |  | 45% of weapon area - 10% fatalities  |

SOURCE : William C. Martel  
And  
Paul L. Savage  
Strategic Nuclear War: What the Superpowers  
Target and Why.  
New York: Greenwood Press, 1986, p. 205

# Nuclear Pursuits

	United States	Soviet Union	Britain	France	China
<b>Warheads in stockpile</b>	20,000	29,000	300	600	500
<b>Peak number of warheads/year</b>	32,500 1967	33,000 1959	300 1991	600 1991	500 1991
<b>Number of known test explosions (end of 1990)</b>	929	715	43	186	36
<b>First fission test, type/yield</b>	July 16, 1945 Plutonium/23 kt.	Aug. 29, 1949 Plutonium/20 kt.	Oct. 3, 1952 Plutonium/25 kt.	Feb. 13, 1960 Plutonium/60-70 kt.	Oct. 16, 1964 U-235/20 kt.
<b>First test of boosted fission weapon/yield</b>	May 8, 1951 46 kt.	Aug. 12, 1953 200-300 kt.	May 15, 1957 ? ? kt.	Sept. 24, 1966 150 kt.	May 9, 1966 ~ 200 kt.
<b>First multistage thermonuclear (hydrogen bomb) test/yield</b>	Oct. 31, 1952 10.4 mt.	Nov. 22, 1955 1.6 mt.	Nov. 8, 1957 ? ? mt.	Aug. 24, 1968 2.6 mt.	June 17, 1967 3 mt.
<b>First airdrop explosion of nuclear weapon, aircraft used</b>	Aug. 6, 1945 B-29	Nov. 6, 1955 Bear ?	Oct. 11, 1956 Valiant	July 19, 1966 Mirage IV-A	May 14, 1965 Hong 6
<b>Known atmospheric tests</b>	212	~215	21	48	22
<b>Largest atmospheric test</b>	Feb. 28, 1954 15 mt.	Oct. 30, 1961 58 mt.	1957-58 ? mt.	Aug. 24, 1968 2.6 mt.	Nov. 17, 1976 4 mt.
<b>Last atmospheric test</b>	Nov. 4, 1962	Dec. 25, 1962	Sept. 23, 1958	Sept. 15, 1974	Oct. 16, 1980
<b>Largest underground test</b>	Nov. 6, 1971 5 mt.	Oct. 27, 1973 2.8-4 mt.	Dec. 5, 1985 <150 kt.	July 25, 1979 120 kt.	Aug. 16, 1990 50-200 kt.
<b>Atomic bomb developers</b>	J. Robert Oppenheimer, Gen. Leslie Groves	Igor Kurchatov	William Penney	Gen. Charles Ailleret, Pierre Guillaumat	Nie Rongzhen, Lu Jie, Li Jue
<b>Hydrogen bomb developers</b>	Stanislaw Ulam, Edward Teller	Andrei Sakharov, Yuliy Khariton, Yakov Zel'dovich	William Penney	Robert Dautray	Deng Jiaxian, Yu Min, Peng Huanwu
<b>Current test sites</b>	Nevada	Semipalatinsk, Novaya Zemlya	Nevada	Moruroa atoll, Fangataufa atoll	Lop Nur (Malan)
<b>First operational ICBM</b>	Oct. 31, 1959 Atlas D	1960 SS-6	n.a.	Aug. 2, 1971 S-2 IRBM	1979 Dong Feng 5
<b>First nuclear-powered naval vessel enters service</b>	Jan. 1955 Nautilus SSN	Aug. 1958 November SSN	1963 Dreadnought SSN	Jan. 1971 Redoutable SSN	1974 Han SSN
<b>First SSBN patrol with Polaris-type SLBM, vessel, missile</b>	Nov. 15, 1960 Washington Polaris A1 --	1968 Yankee SS-N-6	June 1968 Resolution Polaris A3	Jan. 29, 1972 Redoutable M1	1966 Xia Julang-1
<b>First MIRVed missile deployed</b>	Aug. 19, 1970 Minuteman III	1974 SS-18 or 19	(1994) (Trident II)	April 1985 M-4 SLBM	none
<b>Final assembly plant</b>	Pantex near Amarillo, Texas	Chelyabinsk?	Burghfield Royal Ordnance near Reading	Valduc in Côte-d'Or	Subei (Gansu), Guangyuan (Sichuan)
<b>Chief design labs</b>	Los Alamos in New Mexico, Lawrence Livermore in California	Arzamus-16, Chelyabinsk-70	Aldermaston, near Reading	Limeil-Valenton in Val-de-Marne	Ninth Academy in Haiyan (Qin-hai), Mianyang (Sichuan)
<b>Current directors, developers</b>	James Walker, Energy Secretary, Siegfried Hecker, dir., Los Alamos; John Nuckolls, dir., Livermore	V. Kononov, minister of Atomic Power and Industry; Yuliy Khariton, dir.; Arzamus-16, Evgeniy Avronn, dir., Chelyabinsk-70	Donald Spiers, controller of Establishments, Research and Nuclear; Brian Richards, dir., Aldermaston	Roger Baleras, dir., Direction des Applications Militaires	Jian Xinxiong, minister of Nuclear Industry; Hu Renyu, dir., Ninth Academy

"Boosted": small quantities of tritium and deuterium incorporated in fission weapon to increase efficiency of yield. **kt.:** kilotons. **mt.:** megatons. **ICBM:** intercontinental ballistic missile. **IRBM:** intermediate range ballistic missile. **SSN:** nuclear powered submarine. **SSBN:** nuclear powered ballistic missile submarine. **SLBM:** submarine launched ballistic missile

SOURCE: The Bulletin of The Atomic Scientists  
Chicago, May 1991  
p. 49

# KNOWN NUCLEAR TESTS WORLDWIDE, 1945 TO DECEMBER 31, 1990

Year	U.S.	S.U.	U.K.	FR	CH	Total
1945	3	0	0	0	0	3
1946	2	0	0	0	0	2
1947	0	0	0	0	0	0
1948	3	0	0	0	0	3
1949	0	1	0	0	0	1
1950	0	0	0	0	0	0
1951	16	2	0	0	0	18
1952	10	0	1	0	0	11
1953	11	4	2	0	0	17
1954	6	7	0	0	0	13
1955	18	5	0	0	0	23
1956	18	9	6	0	0	33
1957	32	15	7	0	0	54
1958	77	29	5	0	0	111
1959	0	0	0	0	0	0
1960	0	0	0	3	0	3
1961	10	50	0	2	0	62
1962	96	44	2	1	0	143
1963	44	0	0	3	0	47
1964	38	6	1	3	1	49
1965	36	10	1	4	1	52
1966	43	15	0	7	3	68
1967	34	17	0	3	2	56
1968	45	15	0	5	1	66
1969	38	16	0	0	2	56
1970	35	17	0	8	1	61
1971	17	19	0	6	1	43
1972	18	22	0	3	2	45
1973	16	14	0	5	1	36
1974	14	18	1	8	1	42
1975	20	15	0	2	1	38
1976	18	18	1	4	4	45
1977	19	18	0	6	1	44
1978	17	27	2	8	3	57
1979	15	29	1	9	1	55
1980	14	21	3	13	1	52
1981	16	22	1	12	0	51
1982	18	32	1	6	1	58
1983	17	27	1	9	2	56
1984	17	29	2	8	2	58
1985	17	9	1	8	0	35
1986	14	0	1	8	0	23
1987	14	23	1	8	1	47
1988	14	17	0	8	1	40
1989	11	7	1	8	0	27
1990	8	1	1	6	2	18
<b>929</b>	<b>715*</b>	<b>43</b>	<b>186*</b>	<b>36</b>	<b>1,910*</b>	

\*Totals include 85 Soviet and 2 French tests not identified by date, and one 1974 underground explosion by India

SOURCE: *The Bulletin of The Atomic Scientists*  
Chicago, April, 1991  
p. 49.

Fewer nuclear tests were conducted in 1990 than in any year since 1954, excluding the U.S./U.K./Soviet moratorium of November 1958 to September 1961.

Since 1945 at least 1,910 known nuclear test explosions have been conducted, about 86 percent of them by the United States and Soviet Union. For the entire period the average has been one test every nine days. Dating from each country's first explosion, the rate for the United States is one test every 18 days; Soviet Union, one test every 22 days; France, one test every 61 days; China, one test every 266 days; and the United Kingdom, one test every 330 days.

The United States does not announce all of its tests. The U.S. total includes 116 unannounced tests, the most recent of which was conducted on April 6, 1990. It is likely that several dozen more remain to be discovered. Twenty-seven of the total were peaceful nuclear explosions (PNEs) conducted between 1961 and 1973. Recent annual U.S. testing budgets have been approximately \$600 million. Vertical shaft tests cost around \$30 million each, and the more complicated horizontal-tunnel weapons-effects tests cost \$50-60 million each.

Included in the Soviet total are 18 tests which, according to the Swedish National Defense Research Institute, took place between 1949 and 1958 but for which a breakdown by year is not available. Information has now come to light on other, previously unreported Soviet tests. In an article on the seismic characteristics of 96 tests conducted at Semipalatinsk between October 1961 and the end of 1972 (*Atomic Energy*, September 1989), Soviet scientists revealed that one additional test was conducted on October 14, 1965, and two additional tests were conducted in 1968, on October 21 and November 11. A U.S. scientist who reexamined the Soviet seismic record discovered two tests, one conducted on March 20, 1976, and one on July 19, 1982. These five documented tests have been added to the list, bringing the number of Soviet tests with known dates to 630. However, V.N. Mikhailov, the key official of the Ministry of Atomic Power and Industry, confirms that there have been additional tests. Mikhailov put the total number of Soviet tests (excluding the October 24, 1990, test) at 714 (see "Nuclear Notebook," November 1990). Mikhailov said that a total of 467 weapons tests have been conducted in Kazakhstan, and 131 on the Arctic island of Novaya Zemlya. Mikhailov specified that since 1963, there have been 499 underground weapons tests—343 in Kazakhstan, and 131 at Novaya Zemlya. Another 115 underground explosions were carried out for "peaceful purposes." While these new figures are important, contradictions remain which may eventually be resolved by future disclosures.

Beginning in 1962, the United Kingdom has conducted 22 of its 43 tests jointly with the United States at the Nevada Test Site.

A French Ministry of Defense document is the only source of information on five of the French tests. Two of these tests, included only in the total, occurred sometime between 1975 and 1977, but their exact dates are unknown.

The precise dates of all 36 Chinese tests are now known. The overall total includes one Indian underground test on May 18, 1974.

# U.S. NUCLEAR WEAPONS STOCKPILE (JUNE 1991)

Warhead/Weapon	First produced	Yield (kilotons)	User	Number (warheads)	Status
<b>Bombs</b>					
B28*	8/58	1,100	AF	100	Being replaced by B61 and B83. No IHE.
B53*	8/62	9,000	AF	50	Being replaced by B83 bomb. No IHE.
B57 strike bomb*	1/63	<1 to 20	AF, MC, N, NATO	600	B90 replacement cancelled; may be replaced by upgraded B61. No IHE.
B57 depth bomb*	1/63	<1 to 20	N, NATO	550	With B90 cancelled, no apparent replacement. No IHE.
B61-0, -6,** -7	10/66	10 to 500	AF	900	Strategic bomb. Mod-7 is a converted Mod-1 with a Cat D PAL and IHE. Mod-6 is converted Mod-0 with a Cat D PAL and IHE. Some Mod-7 bombs may be converted into W61 earth penetrator weapons.
B61-2, -5	3/75	10 to 345	AF, MC, N, NATO	625	Tactical bomb replacing B28, B43, B57. Cat D PAL; no IHE.
B61-3**, -4**/10**	5/79	10 to 345	AF, NATO	1,600	Tactical bomb. Mod-10 is converted W85. Mod-3 yield is higher than Mod-10. Mod-4 yield is lower than Mod-10. All have Cat F PALs and IHE.
B83**	6/83	low to 1,200	AF	800	Strategic bomb replacing B28, B43, B53. IHE, Cat D PAL, and FRP.
<b>Artillery</b>					
W33/8-inch*	1/57	<1 to 12	A, MC, NATO	500	Portion replaced by W79/8-inch. Last gun-assembly-type weapon. Combination lock, no IHE.
W48/155mm*	10/63	0.1	A, MC, NATO	900	W82 replacement cancelled May 1990. Combination lock, no IHE.
W79/8-inch ER (enhanced radiation)	9/81	0.8	A	40	May have been converted to non-enhanced radiation versions or had tritium removed. Cat D PAL, no IHE.
W79/8-inch	10/84	1.1	A, MC, NATO	300	Production completed August 1986. Cat D PAL, no IHE.
<b>Short-range missiles</b>					
W70-0, -1, -2/Lance	6/73	1 to 100	A, NATO	900	Follow-on-to-Lance cancelled May 1990. Cat D PAL, no IHE.
W70-3/Lance ER (enhanced radiation)	5/81	<1	A	350	May have been converted to non-enhanced versions or had tritium removed. In storage at U.S. army depots. Cat D PAL, no IHE.
<b>Submarine-launched ballistic missiles</b>					
W68/Poseidon C3*	5/70	50	N	1,500	Final nine submarines to be retired by 1992. No IHE.
W76/Trident I C4*	6/78	100	N	3,175	W76 warheads will arm the fifth and subsequent Atlantic Fleet ballistic missile submarines if Rocky Flats is not reopened, or if alternate means to supply "pits" for W88s are not found. No IHE.
W88/Trident II D5**	9/88	475	N	400	First four Atlantic Fleet Trident II submarines will be armed with fewer W88 warheads per missile than originally planned. Plan to retrofit eight Pacific-based submarines with Trident II ballistic missiles apparently has been cancelled. Warhead undergoing study for possible redesign to substitute IHE.
<b>Intercontinental ballistic missiles</b>					
W56/Minuteman II*	3/63	1,200	AF	455	Beginning Oct. 1991, 75 per year to be retired. No IHE.
W62/Minuteman III*	3/70	170	AF	610	Partially replaced by Mk 12A/W78 and MX/W87. No IHE.
W78/Minuteman III	8/79	335	AI	920	Retrofitted between Dec. 1979 and Feb. 1983. No IHE.
W87-0/MX	4/86	300	AF	525	200-500 more for small-intercontinental ballistic missile if deployed in late 1990s. IHE and FRP.
<b>Air-to-surface missiles and cruise missiles</b>					
W69/SRAM A*	10/71	170	AF	1,100	May be replaced by W89/SRAM II, 1994-96. No IHE.
W80-0/SLCM**	12/83	5 to 150	N	350	Originally 758 planned for 200 ships and submarines, now reduced to 637 for 175. Cat D PAL, IHE.
W80-1/ALCM	12/81	5 to 150	AF	1,660	Production ceased. Cat D PAL and IHE.
W80-1/AGM**	7/90	5 to 150	AF	90	Scheduled to be operational in 1991. Original program, 1,461 missiles, now cut to 1,000. Cat D PAL, IHE.

\*Weapons currently scheduled for partial or complete retirement in 1990s. \*\*Scheduled for production. A—Army; AF—Air Force; MC—Marine Corps; N—Navy; NATO—non U.S. delivery systems. SLCM—sea-launched cruise missile; SRAM—short range attack missile; ALCM—air-launched cruise missile; ACM—advanced cruise missile; IHE—insensitive high explosive; Cat—category; PAL—permissive action link; FRP—fire resistant pit. In weapons nomenclature, B stands for "bomb" and W for "warhead." The number following the letter indicates the approximate order in which it was introduced into the stockpile; for example, W69 followed W68.

These are authors' estimates of stockpile breakdown of approximately 19,000 warheads of 19 types, split 65 percent with strategic forces and 35 percent with non-strategic forces. By service, the stockpile is divided 48 percent air force, 37 percent navy and marine corps, and 15 percent army. Five warhead types are scheduled for production during 1991—B61-3, -4/10, B83, W80-0, W80-1, W88—although with key facilities in the complex shut down, few, if any, new bombs or warheads are likely to be produced. Most activity will be modifications of older weapons to add safety and security features and dismantling older types. Since last year's table, four types were removed from the operational stockpile, the W50 for the Pershing 1a, the W84 for the ground-launched cruise missile, the W85 for the Pershing II, and the last B43 bombs. Of the 19 different types currently in the stockpile, Los Alamos National Laboratory designed 12 and Lawrence Livermore National Laboratory, seven (W56, W62, W68, W70, W79, W87, B83). About 25 percent of the weapons in the stockpile have insensitive high explosive, 10 percent have fire resistant pits (FRP), and about 50 percent have the enhanced nuclear detonation safety (ENDS) system. FRPs reduce the likelihood of plutonium dispersal in the event of a 1000 degree Centigrade temperatures of an aircraft fuel fire that lasts for several hours. ENDS is designed to prevent premature arming of nuclear weapons, subjected to abnormal environments, by isolating electrical elements critical to detonation.

SOURCE: The Bulletin of The Atomic Scientists  
Chicago, June, 1991  
p. 49  
ID

# ESTIMATED SOVIET NUCLEAR STOCKPILE (JULY 1990)

Estimating the size and composition of the Soviet nuclear stockpile is extraordinarily difficult. The Soviet government's excessive secrecy and the lack of explicit public U.S. government estimates of Soviet nuclear warhead production and deployment mean that virtually no trustworthy official information is available. This table represents the most extensive public attempt to estimate the size of the Soviet stockpile. It is adapted from *Nuclear Weapons Databook Volume IV: Soviet Nuclear Forces* (New York: Ballinger, 1989), where each weapon category is treated in greater detail and the methodology is explained.

This estimate shows that the Soviet stockpile is almost 45 percent larger than the U.S. stockpile (see June 1990 *Bulletin*) and is composed of a greater variety of nuclear weapons. Currently there are 62 types in the Soviet arsenal, including 17 ballistic missile types, 12 kinds of airplanes and helicopters, seven types of air-to-surface and seven types of surface to air missiles (including two ABMs), various kinds of ASW weapons (including two types of nuclear torpedoes), three calibers of artillery, atomic land mines, and possibly sea mines.

Among the five branches of the armed forces, the navy has the most types of nuclear weapons, followed by the strategic

rocket forces and the air forces. The strategic rocket forces have the most warheads, with about 8,000. Fifty-three percent of Soviet warheads are used for strategic forces (offense and defense) and 47 percent for nonstrategic forces. Unlike the U.S. stockpile, it is not known how many different warhead types or modifications exist for these systems. It is conceivable that several kinds of missiles all use the same warhead type. It is estimated that there are three different types of gravity bombs and two types of nuclear depth bombs. The Soviet nuclear arsenal seems to have peaked in 1988 at 33,000 and is undergoing a gradual decrease.

Developments and changes since last year include: continuing retirement of SS-11, SS-17, and SS-19 ICBMs coupled with deployments of SS-24 and SS-25 ICBMs, the modest growth of SLCMs, withdrawal from operation of all Bear A bombers, SA-1 SAMs, naval nuclear artillery, and nuclear capable MiG-21 Fishbed aircraft, withdrawal and destruction of many SS-20s and the last SS-4s. The table reflects a reassessment of the SA-N-6 SAM as a non-nuclear missile. As occurred in the U.S. military 10-20 years ago, certain military missions that currently have nuclear weapons will be phased out either unilaterally or by treaty. For example, SAM forces are being denuclearized.

Category/type	Weapon system	Launchers	Warheads
<b>Strategic offense</b>			
ICBMs	SS-11, SS-13, SS-17, SS-18, SS-19, SS-24, SS-25	1,353	7,300
SLBMs	SS-N-6, SS-N-8, SS-N-17, SS-N-18, SS-N-20, SS-N-23	914	4,000
Bombers	Blackjack, Bear B/C/G/H (AS-3 and AS-4 ASMs, AS-15 ALCMs, AS-16 SRAMs, bombs)	160	1,400
<b>Subtotal</b>			<b>12,700</b>
<b>Strategic defense</b>			
ABMs	Improved Galosh, Gazelle	100	110
SAMs	SA-2, SA-5, SA-10	6,050	3,000
<b>Subtotal</b>			<b>3,100</b>
<b>Land-based nonstrategic</b>			
Missiles	SS-20, Scud B, SS-21, FROG 3/5/7	1,470	3,600
Bombers and fighters	Backfire, Blinder, Badger, Fencer, Flogger, Fitter, (AS-2, AS-4, AS-5, AS-6, ASMs, bombs)	2,595	4,500
Artillery	152mm; 203mm, 240mm	7,000	2,000
Atomic demolitions		NA	NA
<b>Subtotal</b>			<b>10,000</b>
<b>Naval nonstrategic</b>			
Attack aircraft	Backfire, Blinder, Badger, Fencer, Flogger (AS-2, AS-4, AS-5, AS-6 ASMs, bombs)	395	1,000
SLCMs	SS-N-3, SS-N-7, SS-N-9, SS-N-12, SS-N-19, SS-N-21, SS-N-22	1,064	578
ASW aircraft	Mail, May, Bear F, Hormone A, Helix A	375	400
ASW weapons	SS-N-15, SS-N-16, FRAS-1, Type 65 and ET-80 torpedoes	534*	1,000
Anti-air weapons	SA-N-1, SA-N-3	51*	200
Coastal missiles	SSC-1B	100	100
Mines		NA	NA
<b>Subtotal</b>			<b>3,300</b>
<b>Total</b>			<b>30,000</b>

\*Total number of ships and submarines, not launchers. ABM: anti-ballistic missile; ALCM: air-launched cruise missile; ASM: air-to-surface missile; ASW: Anti-submarine warfare; ICBM: intercontinental ballistic missile; SAM: surface-to-air missile; SLBM: submarine-launched ballistic missile; SLCM: sea-launched cruise missile; NA: not available.

SOURCE: *The Bulletin of The Atomic Scientists*  
Chicago, July/August, 1990  
p. 49

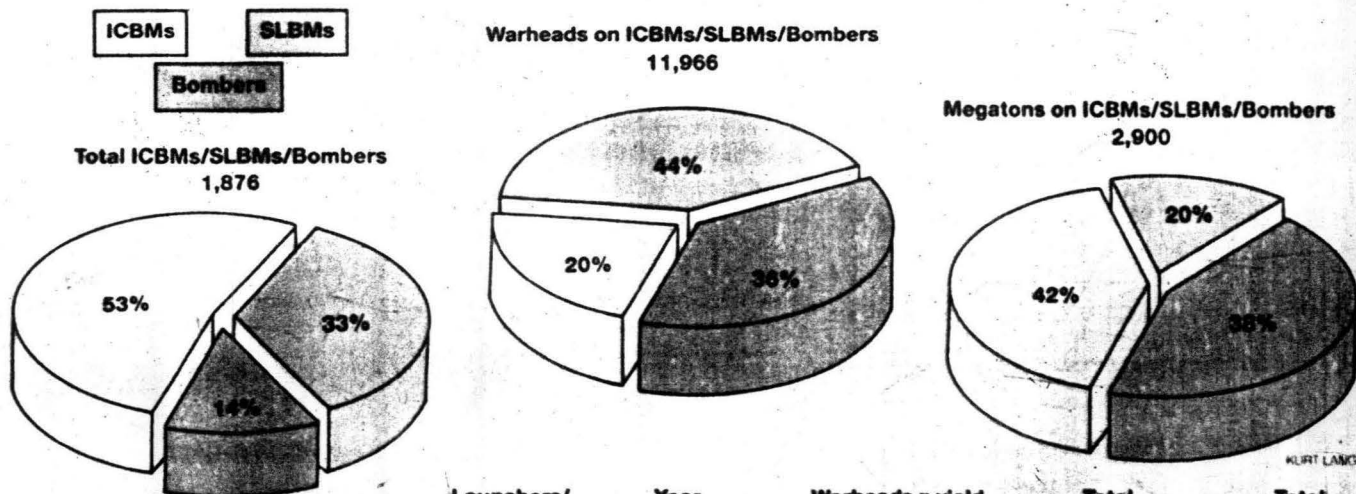
# U.S. STRATEGIC NUCLEAR FORCES, END OF 1990

Numbers of U.S. strategic weapons decreased slightly from last year to just below 12,000. Fiscal constraints, changing operational requirements, tritium shortages, and an impending arms control agreement will cause the strategic arsenal to decrease eventually to about 8,600 warheads.

The year's most significant development was the entry into service of the Trident II D-5 submarine-launched ballistic missile (SLBM). The *USS Tennessee*, the first submarine to carry the missile, went on patrol March 29, giving the United States a counterforce capability from the sea-based leg of the triad for the first time. The second submarine to carry the Trident II, the *USS Pennsylvania*, was scheduled to go on its first patrol by the end of 1990. The third Trident II submarine, the *USS West Virginia*, was commissioned on October 20 and could be operational in 1991. The *USS Henry Clay* was deactivated on March 12 and the *USS Daniel Webster*, on August 30, bringing to eight the number of Poseidon SSBNs withdrawn from service since September 1985, and eliminating a total of 120 C-3 SLBMs and 1,200 W68 warheads from ser-

vice. The remaining 11 SLBMs carrying the Poseidon missile will be retired by the end of 1992, several years earlier than originally planned, to save money and to comply with START.

The ICBM force has remained unchanged over the past two years. The number of B-52G bombers with primary nuclear missions decreased slightly. In June the Strategic Air Command began to turn over FB-111A bombers to the Tactical Air Command, where they are redesignated as F-111Gs. All 29 aircraft of the 509th Bomb Wing at Pease Air Force Base, New Hampshire, were delivered to Cannon Air Force Base, New Mexico, by the end of the year; and 29 other FB-111As with the 380th Bomb Wing at Plattsburgh in New York will be transferred by the first quarter of 1992. A small number of B83 bombs was delivered to Strategic Air Command during the year; but larger numbers of older bombs were retired, reflecting the reduced number of operational bombers. The numbers of air-launched cruise missiles and short-range attack missiles remained the same. The advanced cruise missile is scheduled to be operational in March 1991, almost four years late.



Type	Name	Launchers/ SSBNs	Year deployed	Warheads x yield (megaton)	Total warheads	Total megatons*
<b>ICBMs</b>						
LGM-30F	Minuteman II	450	1966	1 x 1.2	450	540
LGM-30G	Minuteman III:	500			1,500	404
	Mk-12	(200)	1970	3 x .170 (MIRV)	(600)	(102)
	Mk-12A	(300)	1979	3 x .335 (MIRV)	(900)	(302)
LGM-118A	MX/Peacekeeper	50	1986	10 x .300 (MIRV)	500	150
<b>Total</b>		<b>1,000</b>			<b>2,450</b>	<b>1,094</b>
<b>SLBMs</b>						
UGM-73A	Poseidon C-3	176/11	1971	10 x .050 (MIRV)	1,760	88
UGM-96A	Trident IC-4	384/20	1979	6 x .100 (MIRV)	3,072	307
UGM-133A	Trident II D-5	48/2	1990	8 x .475 (MIRV)	384	182
<b>Total</b>		<b>608/33</b>			<b>5,216</b>	<b>578</b>
<b>Bombers**</b>						
B-1B		90	1986	{ ALCM .05-.150 SRAM .170 Bombs .500	1,600	240
B-52G/H		154	1958/61		1,100	187
FB-111A		24	1969		1,600	800
<b>Total</b>		<b>268</b>			<b>4,300</b>	<b>1,227</b>
<b>GRAND TOTAL</b>		<b>1,876</b>			<b>11,966</b>	<b>~2,900</b>

\*Numbers may not add due to rounding. \*\*Bomber numbers exclude an additional seven B-1B, 25 B-52, and five FB-111A spare and test aircraft. Bombers are loaded in a variety of ways depending on mission, but most aircraft carry SRAMs and bombs. B-1Bs and FB-111s do not carry ALCMs. ALCM—air-launched cruise missile; AS—air-to-surface stand-off missile; ICBM—intercontinental ballistic missile, range of 5,700-15,360 kilometers; MIRV—multiple independently targetable reentry vehicle; SLBM—submarine-launched ballistic missile; SRAM—short-range attack missile; SSBN—nuclear-powered ballistic missile submarine.

SOURCE: The Bulletin of The Atomic Scientists  
 Chicago, February, 1991  
 48 The Bulletin of the Atomic Scientists  
 P. 48

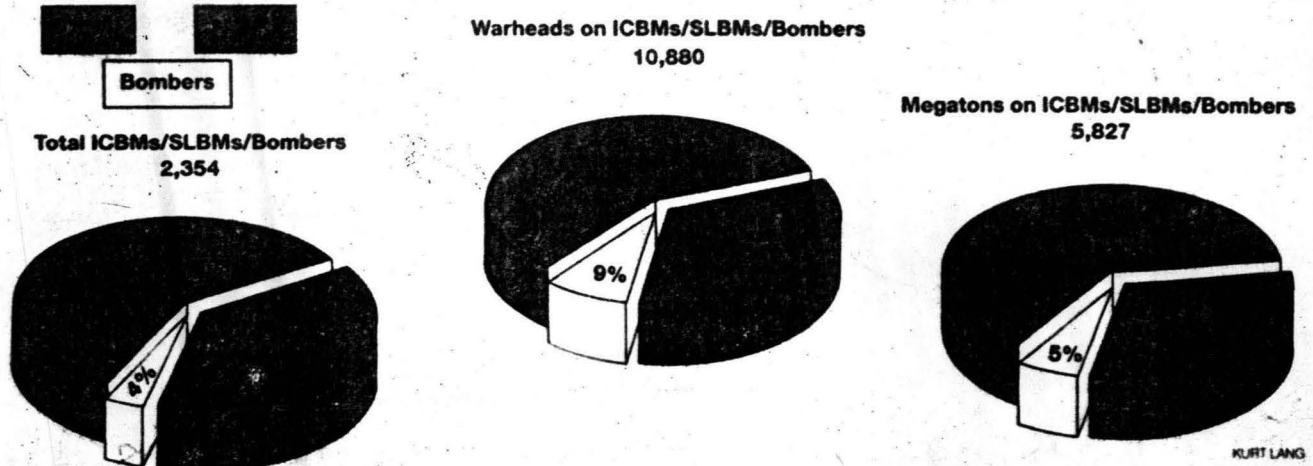


# SOVIET STRATEGIC NUCLEAR FORCES, END OF 1990

Soviet strategic offensive forces peaked in 1989. In the last year there was a net reduction of 440 weapons, to just under 11,000. Although the Soviet Union continued modernizing all three "legs" of its triad, that effort is clearly coming to an end. In 1990 approximately 130 SS-25s were deployed, as were 18 rail-mobile and 10 silo based SS-24s. The Soviets have announced that SS-24 production will cease as of January 1, 1991, with 36 missiles on 12 trains deployed at three sites. It is estimated that an additional 60 SS-24s will be based in former SS-19 silos. The SS-18 also remained in production, as older Mod 1/3/4 missiles were replaced with 10-warhead Mod 5 and single-warhead Mod 6 missiles. Several types of older ICBMs are being reduced. The entire force of SS-11, SS-13, SS-17, and SS-19 missiles

will probably be eliminated to meet strategic arms reduction treaty (START) ceilings. The sixth and final Typhoon submarine, and the sixth Delta IV submarine became operational during 1990; a seventh Delta IV was launched.

The bomber force will be smaller than was initially anticipated. The program to convert Bear B/C bombers to Bear G models is complete at approximately 60 aircraft, which are assumed to no longer have a strategic offensive role. Modest production of the new Bear H bomber continued; the Soviets have announced that eventually about 90 will be produced. A handful of new Blackjack bombers were added to the force. While an original force of 100-140 Blackjacks was planned, technical problems and budgetary constraints make a force of about 30 more likely.



Type	Name	Launchers	Year deployed	Warheads x yield (megaton)	Total warheads	Total megatons
<b>ICBMs</b>						
SS-11	Sege					
M2		100	1973	1 x 1.1	100	110
M3		210	1973	3 x .350 (MRV)	210*	221
SS-13 M2	Savage	30	1973	1 x .750	30	23
SS-17 M3	Spanker	50	1979	4 x .750 (MIRV)	200	150
SS-18 M4/M5/M6	Satan	308	1979	10 x .550/.750 (MIRV)	3,080**	1,688
SS-19 M3	Stiletto	250	1979	6 x .550 (MIRV)	1,500	825
SS-24 M1/M2	Scalpel	86	1987	10 x .550 (MIRV)	860	473
SS-25	Sickle	300	1985	1 x .550	300	165
<b>Total</b>		<b>1,334</b>			<b>6,280</b>	<b>3,655</b>
<b>SLBMs</b>						
SS-N-6 M3	Seb	176 (11)†	1973	2 x 1 (MRV)	176*	352
SS-N-8 M1/M2	Sawfly	286 (23)	1973	1 x 1.5	286	429
SS-N-17	Snipe	12 (1)	1980	1 x 1	12	12
SS-N-18 M1/M3	Stingray	224 (14)	1978	3/7 x .500 (MIRV)	1,568***	784
SS-N-20	Sturgeon	120 (6)	1983	10 x .200 (MIRV)	1,200	240
SS-N-23	Skiff	96 (6)	1986	4 x .100 (MIRV)	384	38
<b>Total</b>		<b>914</b>			<b>3,626</b>	<b>1,855</b>
<b>Bomber/weapons</b>						
Tu-142	Bear H	85	1984	8 AS-15 ALCMs or bombs	680	170
Tu-160	Blackjack	21	1988	6 AS-15 ALCMs, 4 AS-16 SRAMs, and 4 bombs	294	147
<b>Total</b>		<b>106</b>			<b>974</b>	<b>317</b>
<b>GRAND TOTAL</b>		<b>2,354</b>			<b>10,880</b>	<b>5,827</b>

\*SS-11 Mod 3 and SS-N-6 Mod 3 MRV warheads counted as one. \*\*Some SS-18s carry a single warhead, although under START all will be counted as carrying ten. \*\*\*Under START, the number of warheads on the SS-N-18 is expected to be reduced to three. †Numbers in parentheses represent missile-carrying submarines. **ALCM**—air-launched cruise missile; **AS**—air-to-surface missile; **ICBM**—intercontinental ballistic missile; range of 5,760-15,360 kilometers; **MIRV**—multiple independently targetable reentry vehicles; **MRV**—multiple reentry vehicles; **SLBM**—submarine-launched ballistic missile; **SRAM**—short-range attack missile.

SOURCE: The Bulletin of The Atomic Scientists  
Chicago, March 1991  
p. 49

# LESSER NUCLEAR POWERS: FRANCE

In comparison to U.S. and Soviet stockpiles, the British, French, and Chinese nuclear arsenals are relatively small, but still capable of causing mass destruction. The table below describes the French nuclear arsenal. (For British and Chinese estimated arsenals, see the November 1990 *Bulletin*.)

With over 600 nuclear weapons, the French arsenal is about twice as large as that of the British or Chinese. Total French megatonnage is estimated at 135, a fraction of the U.S.-Soviet total of some 15,000 megatons. But the French arsenal is a miniature version of the U.S. and Soviet nuclear triads, with strategic bombers, silo-based ballistic missiles, and submarine-launched ballistic missiles.

Manned bombers and land-based ballistic missiles are controlled by the Commandement des Forces Aériennes Stratégiques (FAS). Since 1986, Mirage IV-P bombers have been outfitted with a supersonic air-to-ground missile with a 100-300 kilometer range, the Air-Sol Moyenne Portée (ASMP), which is similar to the U.S. SRAM II. FAS also deploys S-3D ballistic missiles in hardened underground silos on the Plateau d'Albion in southeastern France, near Apt.

The Force Océanique Stratégique (FOS) operates six ballistic missile submarines (SSBNs), five of which are being upgraded with new missiles and warheads. The first French submarine, *L'Inflexible*, is the only SSBN with M-4 missiles with TN-70 warheads. The M-4 missiles carried by *Le Tonnant*, *L'Indomitable*, and *Le Terrible* have been retrofitted with an improved, lighter-weight TN-71 warhead. A retrofit of *Le Foudroyant* will be completed in 1993. *Le Redoutable*, scheduled for a 1991 retirement, will not be retrofitted.

France also maintains several types of what it calls "pre-strategic" nuclear forces: aircraft and short range missiles linked to the strategic deterrent forces. The Mirage

2000N/ASMP ("N" for *nucléaire*) has assumed the tactical nuclear role from the Mirage III-E and Jaguar A squadron. A total of 75 Mirage 2000N aircraft are planned, the last to be delivered by the end of 1992. ASMPs were first placed on the Mirage 2000N in 1988. Recently the Super Etendard strike aircraft on French aircraft carriers have also been outfitted with ASMPs.

Unlike the British nuclear forces, French forces are not integrated in the U.S. Single Integrated Operational Plan (SIOP) or the NATO General Strike Plan.

**Weapons under development:** Development of the S-4 IRBM (mobile), a three-warhead MIRV designed to replace or supplement French silo-based missiles, has involved a four-year delay, and its status is unclear. The missile may be cancelled. Six new **Triomphant-class submarines** are planned to enter service from 1994 to 2008. The first three will carry an improved M-4 missile with greater range, penetration aids, and the TN-75 lighter warhead. After 2005, the remaining three will be equipped with the M-5, a 12-warhead, MIRVed missile with a TN-76 warhead. The **Hadès**, a short-range ballistic missile (350-480 kilometers) with variable yield (up to 80 kilotons), originally designed to replace the Pluton, will enter service in 1992, but the program may be cut from 90 to 30 missiles. Two **Charles de Gaulle-class aircraft carriers** designed to replace the Clemenceau class are planned, with sea trials to begin in 1996 and full operations in 1998. The **Rafale D/M** is designed to replace the Mirage IV-P, beginning in 1998. Its first test flight is scheduled for February 1991. The French air force wants 250 of these planes and the navy plans to buy an additional 86. The first deliveries should begin in 1996. The Rafale will initially carry the ASMP, which is scheduled to be replaced or supplemented by the **Air-Sol Longue Portée**, a longer-range missile (1,500 km.) that may be jointly developed with the British.

## FRENCH NUCLEAR FORCES, 1990

Delivery vehicle	Year deployed	Number	Range* (kilometers)	Warhead x yield	Type	Total warheads in stockpile
<b>Strategic forces</b>						
<i>Submarine-based missiles</i>						
M-20 MSBS	1977	32	3,000	1 x 1 mt	TN-61	32
M-4A MSBS	1985	16	4,000-5,000	MIRV 6 x 150 kt	TN-70	96
M-4B MSBS	1987	48	6,000	MIRV 6 x 150 kt	TN-71	288
<i>Land-based missiles</i>						
S-3D SSBS/IRBM	1980	18	3,500	1 x 1 mt	TN 61	18
<i>Aircraft</i>						
Mirage IV-P	1986	18	1,500	1 ASMP x 300 kt	TN-80	18
<b>Prestrategic forces</b>						
Jaguar A	1973***	30	750	1 x 6-8/25 kt†	AN-52	30
Pluton SRBM	1974	44	120	1x 20/25 kt	AN-51††	70
Super Etendard	1978†††	36	650	1 ASMP x 300 kt	TN-81	24
Mirage 2000N	1988	45	1,570	1 ASMP x 300 kt	TN-81**	45
<b>Total</b>						<b>621</b>

\*Range for aircraft indicates combat radius without refuelling. \*\*The TN-81 is an improved TN-80. \*\*\*The Jaguar was first deployed in 1973 but did not carry the AN-52 nuclear bomb until 1974. †Two-thirds of the AN-52 stockpile reportedly consists of a low-yield version, and one-third a high-yield version. ††The same basic device design is used for the AN-52 gravity bomb and the AN-51 Pluton warhead. †††Though first deployed in 1978, the Super Etendard did not carry the AN-52 until 1981. Twenty-four ASMPs are assigned to two squadrons.

AN: arme nucléaire (fission weapon); ASMP: air sol-moyenne portée; IRBM: intermediate range ballistic missile; MSBS: mer-sol-balistique-stratégique; SRBM: short range ballistic missile; SSBS: sol-sol-balistique-stratégique; TN: thermonucléaire

SOURCE: The Bulletin of The Atomic Scientists  
Chicago, December 1990.  
p. 57.

# NUCLEAR WEAPONS AT SEA, 1990

The naval forces of the five nuclear powers possess about 14,600 nuclear weapons, nearly 30 percent of the world's total arsenal. About 750 ships and submarines can fire naval nuclear weapons, down 100 from last year. Approximately 2,800 nuclear capable aircraft and helicopters have attack and/or antisubmarine missions. Fourteen types of ballistic missile submarines (SSBNs) carry 14 types of ballistic missiles. Strategic warheads comprise about 64 percent of the naval total, a ratio that continues to increase. Nonstrategic weapons include sea- and air-launched missiles, bombs, torpedoes, surface-to-air missiles, and coastal missiles.

Significant developments in the last year include the launchings of the Soviet's sixth and last Typhoon and sixth Delta IV SSBN, and the first U.S. Ohio class submarine carrying Trident II missiles. Three older U.S. submarines carrying Poseidon missiles were retired. The nuclear capability of remaining Soviet Golf submarines was eliminated. The final retirement of three types of U.S. nonstrategic weapons, ASROC, SUBROC, and Terrier, resulted in a sharp reduction in the number of nuclear-capable ships. Deployments of Tomahawk sea-launched cruise missiles and their Soviet counterpart, the SS-N-21, continued to gradually increase.

Between 1988 and 1990, the number of nuclear-capable

ships and submarines in the U.S. Navy declined from 292 to 138. During the same period, Soviet nuclear-capable ships and submarines declined from 633 to 565. Superpower navies are becoming smaller than once anticipated. Of the major warships and submarines of the British navy, some 32 percent are nuclear capable, as are 12 percent of the French navy and 2 percent of Chinese ships.

About 575 nuclear power reactors are at sea. The Soviet Union uses 377 reactors to run its fleet of nuclear-powered submarines, cruisers, and icebreakers. Most Soviet submarines have two reactors, as do all Soviet nuclear-powered cruisers and icebreakers. The United States has 162 nuclear reactors in its nuclear-powered submarines, aircraft carriers, cruisers, and a single submersible research vehicle. All U.S. submarines have one reactor each and U.S. cruisers have two. Each of four aircraft carriers has two reactors and one aircraft carrier has eight. British, French, and Chinese vessels operate on single reactors. The impending retirement of dozens of U.S. and Soviet nuclear powered vessels portends a decline in the number of reactors in the 1990s.

For comparison, 414 commercial nuclear power reactors now operate in 26 countries. The United States has 109, the Soviet Union 48, Britain 38, and France 52.

## Weapons

	U.S.	Soviet	UK	France	China	TOTAL
<b>Strategic missile warheads</b>	5,024	3,802	96*	416	26	9,400†
<b>Nonstrategic warheads</b>						
Cruise missiles	325	570	0	0	0	895
Aircraft bombs	1,350	450*	25	36	0*	1,861
Antisubmarine weapons	825	1,300	25	0	0	2,150
Anti-air weapons	0	188	0	0	0	188
Coastal missiles	0	100	0	0	0	100
<b>Subtotal</b>	<b>2,500</b>	<b>2,608</b>	<b>50</b>	<b>36</b>	<b>0</b>	<b>5,200</b>
<b>Total</b>	<b>7,524</b>	<b>6,410</b>	<b>146</b>	<b>462</b>	<b>26</b>	<b>14,600</b>

## Nuclear reactors on naval vessels

Nuclear-powered ship types	U.S.	Soviet	UK	France	China	TOTAL
Ballistic missile submarines	33	122	4	6	2	167
Cruise missile submarines	0	78	0	0	0	78
Attack submarines	92	149	16	4	3	265
Aircraft carriers	18	0	0	0	0	18
Cruisers	18	6	0	0	0	24
Other	1	22	0	0	0	23
<b>Total</b>	<b>162</b>	<b>377</b>	<b>20</b>	<b>10</b>	<b>5</b>	<b>575</b>

## Nuclear-capable ships and submarines

	U.S.	Soviet	UK	France	China	TOTAL
<b>Submarines</b>						
Ballistic missile	33	61	4	6	2	106
Cruise missile	0	60	0	0	0	60
Attack	50	178	0	0	0	228
<b>Total submarines</b>	<b>83</b>	<b>299</b>	<b>4</b>	<b>6</b>	<b>2</b>	<b>394</b>
<b>Surface ships</b>						
Aircraft carriers	19	4	3	2	0	28
Battleships	4	0	0	0	0	4
Cruisers	16	33	0	0	0	49
Destroyers	16	37	12	0	0	65
Frigates	0	118	15	0	0	133
Patrol combatant	0	74	0	0	0	74
<b>Total surface ships</b>	<b>55</b>	<b>266</b>	<b>30</b>	<b>2</b>	<b>0</b>	<b>353</b>
<b>Total submarines and ships</b>	<b>138</b>	<b>565</b>	<b>34</b>	<b>8</b>	<b>2</b>	<b>747</b>

\*Reflects improved estimates, not increases or reductions from last year.

†Totals may not add up due to rounding.

These tables are adapted from Joshua Handler and William M. Arkin, *Nuclear Warships and Naval Nuclear Weapons: A Complete Inventory*, Neptune Paper No. 5 (Washington, D.C.: Greenpeace, 1990); *Nuclear Weapons Databook Vol. IV: Soviet Nuclear Forces 1989*; and *Nuclear Weapons Databook Vol. I: U.S. Forces and Capabilities* (forthcoming).

Source: *The Bulletin of the Atomic Scientists*  
Chicago, September 1990  
p. 49.

**Table 1**  
**US Nuclear Forces**

Name	No.	MIRVs	Yield	CEP	WLS*	SB**	AB***	Launch	Detonate
MM111A	300	3	335KT	220m	.91	32	88	.9	.85
MM111B	250	3	170KT	315m	.81	25	69	.9	.85
MM11	450	1	1MT	630m	.81	85	227	.9	.8
TITAN	52	1	9MT	1482m	.82	380	962	.75	.75
POSEIDON	256	10	40KT	463m	.74	10	25	.6	.8
TRIDENT	256	10	100KT	250m	.81	17	45	.6	.8
B52A	84	12	200KT	100m	1.02	30	72	.8	.3
B52B	160	6	1MT	100m	1.14	85	227	.8	.3
B52C	59	2	24MT	100m	1.37	860	2301	.8	.3
B52D	16	12	200KT	100m	1.02	30	72	.8	.5
FB111A	30	4	200KT	100m	1.02	30	72	.8	.3
FB111B	30	4	1MT	100m	1.14	85	227	.8	.3

\* Warhead Lethality Score

\*\* Surface-burst area of damage

\*\*\*Air-burst area of damage

SOURCE : William C. Martel and Paul L. Savage

Strategic Nuclear War: What The Superpowers Target And why  
Chicago New York: Greenwood Press, 1986

P. 24.

**Table 2**  
**Soviet Nuclear Forces**

Name	No.	MIRVs	Yield	CEP	WLS*	SB**	AB***	Launch	Detonate
SS19M1	280	6	550KT	400m	.84	56	155	.75	.75
SS19M2	100	1	10MT	250m	1.09	394	1029	.85	.85
SS18M2	107	8	900KT	400m	.87	78	211	.75	.75
SS18M3	26	1	20MT	350m	1.06	632	1691	.85	.85
SS18M4	175	10	500KT	250m	.91	53	145	.75	.75
SS17M1	160	4	750KT	400m	.86	66	181	.75	.75
SS17M2	20	1	6MT	400m	.98	283	707	.80	.85
SS13	60	1	600KT	1900m	.67	58	165	.80	.85
SS11M3	470	1	950KT	1400m	.72	81	215	.75	.80
BearA	30	2	1MT	100m	1.14	85	227	.80	.30
BearB	75	1	1MT	100m	1.14	85	227	.80	.30
Bison	49	1	1MT	100m	1.14	85	227	.80	.30
Backfire	65	1	1MT	100m	1.14	85	227	.80	.30
SSN5	57	1	1MT	2800m	.66	85	227	.35	.60
SSN6	468	1	1MT	1300m	.73	85	227	.35	.65
SSN8	289	1	750KT	1500m	.72	66	181	.65	.65
SSN17	12	1	500KT	1400m	.69	53	145	.35	.70
SSN18	160	3	1MT	1400m	.72	85	227	.65	.75

\* Warhead Lethality Score

\*\* Surface-burst area of damage

\*\*\* Air-burst area of damage

SOURCE: William C. Martel and Paul L. Savage

*Strategic Nuclear War: What The Superpowers Target And Why*

*New York: Greenwood Press, 1986*

*p. 37.*

Table 3  
US Attack on Soviet Command Centers

Target	US Weapon	No.	Total	Detonations	Yield	City	Casualties
Sovad Command	B52D	3	36	12	200KT	Chelyabinsk	1,205,000
Pres. Command	B52D	3	36	12	200KT	Moscow	8,400,000
Mil. Command	B52D	3	36	12	200KT	Volograd	1,210,000
Attack Command	B52D	3	36	12	200KT	Vologda	-----
Pol. Command	B52D	3	36	12	200KT	Irkutsk	550,000
Total		15	180	60			11,365,000

SOURCE: William C. Martel and Paul C. Savage

Strategic Nuclear War: What The Superpowers Target And Why

New York: Greenwood Press

p. 58.

Table 4  
US Attack on Soviet ICBM Fields.

Target	ICBM	No.	US Weapon	No.	Total	Detonations	Yield	City	Casualties
Dombrovskiy	SS18M4	175	MMIIIA	155	465	351	335KT	Orsk	247,000
Tatischevo	SS19M2	100	MMIIIA	88	264	201	335KT	Saratov	1,075,000
Aleysk	SS18M3	26	MMIIIA	24	72	53	335KT	Barnaul	600,000
Yedrovo	SS17M2	20	MMIIIA	19	57	43	335KT	Vologda	237,000
Kartaly	SS18M2	15	MMIIIA	14	42	30	335KT	Kustanay	164,000
	SS18M2	92	MMIIIB	122	366	275	170KT		
Kostroma	SS17M1	97	MMIIIB	128	384	293	170KT	Gorkiy	1,875,000
	SS17M1	63	MMII	272	272	193	1MT		
Pervomaysk	SS19M1	41	MMII	178	178	127	1MT	Kirovograd	237,000
	SS19M1	99	TRIDENT	66	660	297	100KT		
Kozelsk	SS19M1	140	TRIDENT	94	940	424	100KT	Tula	610,000
Teykovo	SS11M3	55	TRIDENT	38	380	176	100KT	Ivanovo	465,000
Perm	SS11M3	82	TRIDENT	54	540	248	100KT	Perm	1,075,000
	SS11M3	3	POSEIDON	5	50	24	40KT		
Derazhyna	SS11M3	55	POSEIDON	65	650	288	40KT	N/A	
Svobodnyy	SS11M3	55	POSEIDON	65	650	288	40KT	Blagoveshensk	172,000
Drovyanaya	SS11M3	110	POSEIDON	127	1270	576	40KT	Chita	302,000
Zhangiz Tobe	SS11M3	79	POSEIDON	91	910	408	40KT	U. Kemenogorsk	274,000
	SS11M3	5	POLARIS	30	80	30	600KT		
	SS11M3	26	B52A	16	192	43	200KT		
Yoshkar Ola	SS13	60	B52A	23	276	61	200KT	Kazan	1,040,000
Total		1398		1724	8688	4429			8,374,000

SOURCE: William C. Martel and Paul L. Savage  
Strategic Nuclear War: What The Superpowers Target And Why  
New York: Greenwood Press, 1986  
p. 63

**Table 5**  
**US Attack on Soviet Bomber and SSBN Bases**

Target	Bomber/SSBN	No.	US Weapon	No.	Total	Detonations	Yield	City	Casualties
Andizhan	BearA	11	B52A	2	24	3	200KT	Andizhan	330,000
Birobidzhan	BearA	11	B52A	2	24	3	200KT	Birobidzhan	67,000
Donetsk	BearA	8	B52A	2	24	3	200KT	Donetsk	2,050,000
Groznyy	BearB	12	B52A	3	36	6	200KT	Groznyy	375,000
Kuldur	BearB	12	B52A	2	24	3	200KT	Kuldur	21,000
Novopokrovka	BearB	11	B52A	2	24	3	200KT	Novopokrovka	67,000
Tula	BearB	10	B52A	2	24	3	200KT	Tula	610,000
Vinnitsa	BearB	10	B52A	2	24	3	200KT	Vinnitsa	313,000
Vladivostok	BearB	10	B52A	2	24	3	200KT	Vladivostok	-----
Voronezh	BearB	10	B52A	2	24	3	200KT	Voronezh	783,000
Bialystok	Bison	5	B52A	2	24	3	200KT	Bialystok	45,000
Gomel	Bison	5	B52A	2	24	3	200KT	Gomel	383,000
Kharkov	Bison	5	B52A	2	24	3	200KT	Kharkov	1,444,000
Kaliningrad	Bison	5	B52A	2	24	3	200KT	Kaliningrad	355,000
Kiev	Bison	5	B52A	2	24	3	200KT	Kiev	2,375,000
Lida	Bison	5	B52A	2	24	3	200KT	Lida	56,000
Minsk	Bison	5	B52A	2	24	3	200KT	Minsk	1,295,000
Ryazan	Bison	5	B52A	2	24	3	200KT	Ryazan	453,000
Ulan Ude	Bison	5	B52A	2	24	3	200KT	Ulan Ude	300,000
Vitebsk	Bison	4	B52A	2	24	3	200KT	Vitebsk	297,000
Anadyr	Backfire	11	B52A	2	24	3	200KT	Anadyr	11,000
Bologoye	Backfire	11	B52A	2	24	3	200KT	Bologoye	34,000
Boru	Backfire	12	B52B	2	12	1	1MT	Boru	62,000
Gorkiy	Backfire	11	B52B	2	12	1	1MT	Gorkiy	-----
Kirov	Backfire	10	B52B	2	12	1	1MT	Kirov	390,000
Tallinn	Backfire	10	B52B	2	12	1	1MT	Tallinn	430,000
Kamchatskiy	SSBN	15	TITANII	6	6	3	9MT	Kamchatskiy	215,000
Polyarnyy	SSBN	20	TITANII	6	6	3	9MT	Murmansk	381,000
Severodinsk	SSBN	20	TITANII	6	6	3	9MT	Archangelsk	385,000
Vladivostok	SSBN	20	TITANII	6	6	3	9MT	Vladivostok	550,000
<b>Total</b>	<b>Bomber</b>	<b>219</b>		<b>53</b>	<b>588</b>	<b>73</b>			<b>12,546,000</b>
	<b>SSBN</b>	<b>75</b>		<b>24</b>	<b>24</b>	<b>12</b>			<b>1,531,000</b>

SOURCE: William C. Martel and Paul L. Savage  
 Strategic Nuclear War: What The Superpowers Target And Why  
 New York: Greenwood Press, 1986.



**Table 6**  
**Soviet Attack on US Command Centers**

Target	Sov. Weapon	No.	Total	Detonations	Yield	City	Casualties
NORAD	SS19M2	15	15	10	10MT	Col. Springs	296,000
Fort Ritchie	SS19M2	15	15	10	10MT	Frederick, MD	26,000
Mount Weather	SS19M2	15	15	10	10MT	Front Royal, VA	10,000
Grand Forks	SS19M2	15	15	10	10MT	Grand Forks, ND	-----
Washington, DC	SS19M2	15	15	10	10MT	Washington,	3,025,000
Total		75	75	50			3,357,000

SOURCE : William C. Martel and Paul L. Savage

New York: Greenwood Press, 1986

Strategic Nuclear War: What The Superpowers Target And Why  
p. 87.

Table 7  
Soviet Attack on US ICBM Fields

Target	ICBM	No.	Sov. Weapon	No.	Total	Detonations	Yield	City	Casualties
Grand Forks AFB	MMIIIA	150	SS18M4	55	550	307	500KT	Grand Forks, ND	99,000
Minot AFB	MMIIIA	150	SS18M4	55	550	307	500KT	Minot, ND	34,000
Malmstrom AFB	MMIIIB	50	SS18M4	19	190	105	500KT	Great Falls, MT	88,000
Warren AFB	MMIIIB	127	SS18M4	46	460	255	500KT	Cheyenne, CO	3,000
	MIIB	73	SS18M2	50	400	222	900KT		
Ellsworth AFB	MMII	84	SS18M2	57	456	252	900KT	Rapid City, SD	93,000
	MMII	66	SS19M1	60	360	202	550KT		
Malmstrom AFB	MMII	150	SS19M1	135	810	454	550KT	Great Falls, MT	-----
Whiteman AFB	MMII	94	SS19M1	85	510	283	550KT	Warrensboro, MO	13,000
	MMII	60	SS17M1	76	304	171	750KT		
Davis-Monthan AFB	TITANII	17	SS17M1	24	96	54	750KT	Tucson, AZ	479,000
Little Rock AFB	TITANII	17	SS17M1	24	96	54	750KT	Little Rock, AR	387,000
McConnell AFB	TITANII	18	SS17M1	26	104	57	750KT	Wichita, KS	411,000
Total		1052		712	4886	2723			1,607,000

SOURCE: William C. Martel and Paul L. Savage  
 Strategic Nuclear War: What The Superpowers Target And Why  
 New York: Greenwood Press, 1986  
 p. 92

**Table 8**  
**Soviet Attack on US Bomber Bases**

Target	Bomber	No.	Sov. Weapon	No.	Total	Detonations	Yield	City	Casualties
Altus AFB	B52A	16	SS13	4	4	2	600KT	Altus, OK	27,000
Barksdale AFB	B52A	16	SS13	4	4	2	600KT	Shreveport, LA	359,000
Beale AFB	B52A	16	SS13	4	4	2	600KT	N/A	
Blythesville AFB	B52A	16	SS13	4	4	2	600KT	Blythesville, AK	25,000
Carswell AFB	B52A	20	SS13	4	4	2	600KT	Fort Worth, TX	351,000
Castle AFB	B52B	16	SS13	4	4	2	600KT	Merced, CA	34,000
Dyess AFB	B52B	16	SS13	4	4	2	600KT	Abilene, TX	130,000
Ellsworth AFB	B52B	16	SS13	4	4	2	600KT	Rapid City, SD	-----
Fairchild AFB	B52B	16	SS13	4	4	2	600KT	Spokane, WA	328,000
Grand Forks AFB	B52B	16	SS13	4	4	2	600KT	Grand Forks, ND	-----
Grissom AFB	B52B	16	SS13	4	4	2	600KT	Peru, IN	13,000
Johnson AFB	B52B	16	SS13	4	4	2	600KT	Goldsboro, NC	36,000
March AFB	B52B	16	SS13	4	4	2	600KT	San Bernardino, CA	104,000
Mather AFB	B52B	16	SS13	4	4	2	600KT	Stockton, CA	320,000
McConnell AFB	B52C	16	SS13	4	4	2	600KT	Wichita, KS	-----
Minot AFB	B52C	16	SS11M3	5	5	2	950KT	Minot, ND	-----
Offutt AFB	B52C	16	SS11M3	5	5	2	950KT	Omaha, NB	589,000
Robins AFB	B52C	16	SS11M3	5	5	2	950KT	Warren-Robins, GA	43,000
Travis AFB	B52C	11	SS11M3	5	5	2	950KT	Berkeley, CA	112,000
Wurtsmith AFB	B52D	16	SS11M3	5	5	2	950KT	Oscoda, MI	7,000
Bremerton AFB	FB111A	10	SS11M3	5	5	2	950KT	Seattle, WA	-----
Loring AFB	FB111A	10	SS11M3	5	5	2	950KT	Limestone, ME	2,000
Plattsburgh AFB	FB111A	10	SS11M3	5	5	2	950KT	Plattsburgh, NY	25,000
Griffis AFB	FB111B	10	SS11M3	5	5	2	950KT	Rome, NY	47,000
Pease AFB	FB111B	10	SS11M3	5	5	2	950KT	Portsmouth, NH	24,000
Sawyer AFB	FB111B	10	SS11M3	5	5	2	950KT	Marquette, MI	75,000
<b>Total</b>		<b>379</b>		<b>115</b>	<b>115</b>	<b>52</b>			<b>2,654,000</b>

SOURCE: William C. Martel and Paul L. Savage  
*Strategic Nuclear War: What The Superpowers Target And Why*  
 New York: Greenwood Press, 1986  
 p. 100

**Table 9**  
**Soviet Attack on US SSBN Bases**

Target	SSBN	No.	Sov. Weapon	No.	Total	Detonations	Yield	City	Casualties
Bangor	SSBN	4	SS17M1	2	8	3	750KT	Seattle, WA	1,524,000
Charleston	SSBN	4	SS17M1	2	8	3	750KT	Charleston, SC	399,000
Kings Bay	SSBN	4	SS17M1	2	8	3	750KT	Brunswick, GA	20,000
Guam, PH	SSBN	4	SS17M1	2	8	3	750KT	Guam, PH	81,000
Holy Loch	SSBN	4	SS17M1	2	8	3	750KT	N/A	
Total		20		10	40	15			2,024,000

SOURCE: William C. Martel and Paul L. Savage  
 Strategic Nuclear War: What The Superpowers Target And Why  
 New York: Greenwood Press, 1986  
 p. 102.

Table 10  
US High-Risk States in Countersilo Attack

State	ICBM	No.	Base
Arkansas	TITAN	17	Little Rock AFB
Arizona	TITAN	17	Davis-Monthan AFB
Kansas	TITAN	18	McConnell AFB
Montana	MMIII MMII	50 150	Malmstrom AFB
Missouri	MMII	150	Whiteman AFB
North Dakota	MMIII MMIII	150 150	Grand Forks AFB Minot AFB
Wyoming	MMIII	200	Warren AFB
South Dakota	MMII	150	Ellsworth AFB

SOURCE: William C. Martel and Paul L. Savage  
Strategic Nuclear War  
New York: Greenwood Press, 1986  
P. 106.

X  
-  
IX

Table 11  
Casualties in New York City for Selected Yields (Air-burst)

Yield	Dead	(%)	Wounded	(%)
500KT	327,000	(3.6)	622,000	(6.8)
550KT	350,000	(3.8)	655,000	(7.6)
750KT	409,000	(4.5)	776,000	(8.5)
950KT	476,000	(5.2)	905,000	(9.9)
1MT	512,000	(5.6)	973,000	(10.7)
6MT	1,600,000	(17.6)	3,030,000	(33.4)
10MT	2,300,000	(25.4)	4,410,000	(48.6)
20MT	3,620,000	(39.9)	5,443,000	(60.1)

SOURCE: William C. Martel and Paul L. Savage  
Strategic Nuclear War: What The Superpowers Target  
And why  
New York: Greenwood Press, 1986  
P. 119.

**Table 12**  
**Distribution of US and Soviet Cities by Population**

Population	United States				Soviet Union			
	No. Cities	(%)	Population	(%)	No. Cities	(%)	Population	(%)
1,000,000+	34	(11.1)	84,659,000	(58.6)	24	(7.8)	43,617,000	(40.4)
750,000-1,000,000	16	(5.3)	11,213,000	(7.8)	6	(2.0)	5,125,000	(4.7)
500,000 - 750,000	21	(7.0)	11,323,000	(7.8)	16	(5.2)	9,015,000	(8.3)
250,000 - 500,000	63	(26.7)	22,111,000	(15.3)	70	(23.0)	24,582,000	(22.8)
100,000 - 250,000	78	(25.6)	12,088,000	(8.4)	157	(51.2)	23,860,000	(22.1)
50,000 - 100,000	20	(6.6)	1,511,000	(1.1)	18	(5.8)	1,128,000	(1.0)
Less than 50,000	72	(23.7)	1,396,000	(1.0)	15	(5.0)	544,000	(0.5)
<b>Total</b>	<b>304</b>		<b>144,301,000*</b>		<b>306</b>		<b>107,871,000**</b>	

\* = 63% of total US population in 1984: 230,000,000.  
 \*\* = 39% of total USSR population in 1984: 275,000,000.

SOURCE : William C. Martel and Paul L. Savage  
 Strategic Nuclear War : What The Superpowers Target And why  
 New York : Greenwood Press, 1986  
 p. 124.

**Table 13**  
**US-USSR Distributed Countervalue Attacks: Casualty Estimates**

	Air-burst		Surface-Burst	
	Dead	Wounded	Dead	Wounded
<b>United States*</b>				
Total	113,587,000	34,690,000	62,445,000	85,832,000
Deliverable	82,485,000	65,792,000	35,631,000	67,998,000
<b>Soviet Union**</b>				
Total	111,075,000	None	111,075,000	None
Deliverable	111,075,000	None	111,075,000	None

\* United States:  
 Population: 148,277,000  
 Area: 400,000  
 Density: 370 persons/sq. mile

\*\* Soviet Union:  
 Population: 107,871,000  
 Area: 23,000  
 Density: 4,700 persons/sq. mile

SOURCE: William C. Martel and Paul L. Savage  
 Strategic Nuclear War: What The Superpowers Target And Why  
 New York: Greenwood Press, 1986  
 p. 129.



Table 14  
Soviet Countervalue Retaliatory Attack

Soviet SSBNs At Sea				Area of Damage		Attrition Rate		
SLBM	SSBN	MIRVs	Total RVs	AB*	SB**	Delivered	AB	SB
SSN5	4	1	12	2,724	1,020	.21	572	214
SSN6	7	1	112	25,424	9,520	.23	5,847	2,189
SSN8	6	1	76	13,756	5,016	.42	5,777	2,106
SSN18	3	3	144	32,688	12,240	.49	16,017	5,997
Total	20		344	74,592	27,796		28,213	10,506

\* AB = Air-burst  
\*\* SB = Surface-burst

SOURCE: William C. Martel and Paul L. Savage  
Strategic Nuclear War: What The Superpowers Target And why  
New York: Greenwood Press, 1986  
P. 132.

Table 15  
Casualties in Moscow for Selected Yields (Air-burst)

Yield	Dead	(%)	Wounded	(%)
40KT	41,000	(0.5)	78,000	(0.9)
100KT	74,000	(0.8)	140,000	(1.6)
170KT	113,000	(1.3)	215,000	(2.5)
200KT	120,000	(1.4)	225,000	(2.6)
335KT	145,000	(1.7)	275,000	(3.3)
600KT	271,000	(3.2)	515,000	(6.1)
1MT	373,000	(4.4)	708,000	(8.4)
9MT	1,580,000	(18.8)	3,000,000	(35.7)
24MT	3,500,000	(41.6)	4,870,000	(58.4)

SOURCE : William C. Martel and Paul L. Savage  
Strategic Nuclear War: What The Superpowers Target  
And Why  
New York : Greenwood Press, 1986  
p. 142.  
XXIV

Table 16  
US Countervalue Retaliatory Attack

SLBM	US SSBNs At Sea			Area of Damage		Attrition Rate		
	SSBN	MIRVs	Total RVs	AB*	SB**	Delivered	AB	SB
POSEIDON	11	10	1,760	44,000	17,000	.48	21,120	8,448
TRIDENT	8	10	1,360	61,200	23,120	.48	23,616	9,178
Total	19		3,120	105,200	40,120		54,736	17,626
POSEIDON	6	10	960	24,000	9,600	.48	11,520	4,608
TRIDENT	3	10	560	25,200	9,520	.48	12,096	4,570
Total	9		1,520	49,200	19,120		23,616	9,178

\* AB = Air-burst  
\*\* SB = Surface-burst

SOURCE: William C. Martel and Paul L. Savage

Strategic Nuclear War: What The Superpowers Target And why

New York: Greenwood Press, 1986

p. 157.

Table 17  
Nuclear War Casualty Projections<sup>1</sup>

City Area <sup>3</sup>	Warhead Yield: Air-burst <sup>2</sup>													
	40KT	100KT	170KT	200KT	335KT	500KT	600KT	750KT	900KT	1MT	9MT	10MT	20MT	24MT
10	65 35	84 16	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0
25	35 65	54 46	70 30	72 28	76 24	94 6	99 1	100 0	100 0	100 0	100 0	100 0	100 0	100 0
50	17 33	31 59	44 56	45 55	53 47	72 28	75 25	77 23	82 18	84 16	100 0	100 0	100 0	100 0
100	9 16	16 30	24 45	25 47	36 58	46 56	50 50	54 46	59 41	62 38	100 0	100 0	100 0	100 0
250	4 7	6 12	10 18	10 19	12 23	20 38	23 43	25 47	29 55	31 60	79 21	81 19	100 0	100 0
500	2 3	3 6	5 9	5 9	6 12	10 19	11 22	13 24	15 28	16 30	56 44	58 42	75 25	85 15
750	1 2	2 4	3 6	3 6	4 8	7 13	8 15	8 16	10 18	10 20	41 59	44 56	62 38	73 27
1000	1 2	2 3	2 5	3 5	3 6	5 10	6 11	6 12	7 14	8 15	33 63	35 65	51 49	62 38
2500	1 1	1 1	1 2	1 2	1 2	2 4	2 4	3 5	3 6	3 6	13 25	14 27	23 44	32 60
5000	1 1	1 1	1 1	1 1	1 1	1 2	1 2	1 2	1 3	2 3	7 13	7 14	12 22	16 30

1. Numbers reflect percentage of dead and wounded; remainder are unharmed.
2. At optimum height-of-burst in clear weather, at 2 psi overpressure level.
3. In square miles for standard metropolitan statistical area (SMSA), with population distributed evenly in SMSA.  
Examples: New York City = 1400; Moscow = 1700; Boston = 1200.

SOURCE: William C. Martel and Paul L. Savage  
Strategic Nuclear War: What The Superpowers Target And Why  
New York: Greenwood Press, 1986  
P-207.

## BIBLIOGRAPHY

## BIBLIOGRAPHY

### Books

- Aldridge, Robert C., First Strike : The Pentagon's Strategy for Nuclear War, (Boston : South End Press, 1983).
- Ardrey, Robert, The Territorial Imperative (New York : Atheneum, 1966).
- Ball, Desmond, and Richelson, Jeffrey, ed., Strategic Nuclear Targeting, (Ithaca and London: Cornell University Press, 1986).
- Barron, John, KGB (New York : Bantam Books, 1974).
- Berman, Robert P. and Baker, John C. Soviet Strategic Forces (Washington D.C., The Brookings Institution 1982).
- Blair, Bruce G., Strategic Command and Control : Redefining the Nuclear threat (Washington, D.C., Brookings Institution, 1985).
- Bracken, Paul, The Command and Control of Nuclear force (New Haven, Connecticut : Yale University Press, 1983).
- Brodie, Bernard, The Absolute Weapon (New York : Harcourt Brace, 1946).
- Brown, Anthony Cave, ed., Dropshot : The American Plan for World War III against Russia in 1957 (New York : Dial Press, 1978).
- Bundy, McGeorge, Danger And survival (New York : Random House, 1988).
- Bunge, William, Nuclear War Atlas (Oxford, Basic Blackwell Ltd., 1989).
- Brzezinski, Z. and Huntington, S., Political Power : USA/USSR (New York : The Viking Press, 1972).
- Clark, Magnus, The Nuclear Destruction of Britain (London: Croom Helm, 1981).
- Clausewitz, Von, On War, J.J. Graham, trans. (London : Routledge, 1908).

- Cockburn, Andrew, The Threat : Inside the Soviet Military Machine (New York : Random House, 1983).
- Collins, John M., U.S.-Soviet Military Balance : Concepts and Capabilities, 1960-1980 (New York : McGraw-Hill Publications Company, 1980).
- Deutscher, I., The Prophet Armed (Oxford: Oxford University Press 1976).
- Douglass, Joseph D., Jr. and Hoerber, Amoretta M., Soviet Strategy for Nuclear War (Stanford: Hoover Institution Press, 1979).
- Dunnigan, James F., How to Make War : A Comprehensive Guide to Modern Warfare (New York: William Morrow and Company, 1983.)
- Dyson, Freeman, Weapons and Hope (New York: Harper and Row, 1984.)
- Earle, Edward Mead, ed., Makers of Modern Strategy (New York: Atheneum, 1966)
- Enthoven, Alain C., "1963 Nuclear strategy Revisited." In Harold P. Ford and Francis X. Winters S.J., Ethics and Nuclear Strategy (Maryknoll : Orbis, 1977).
- Etzold, Thomas, and Gaddis, John Lewis, Containment : Documents on American Policy and Strategy, 1945-1950 (New York : Columbia University Press, 1978).
- Ford, Daniel, The Button (London : Unwin Paperbacks, 1985).
- Frank, Lewis Allen, Soviet Nuclear Planning : A Point of View of SALT. Washington, D.C. : American Enterprise Institute, 1977).
- Garthoff, Raymond L., Soviet Military Policy : A Historical Analysis (New York : Praeger, 1966).
- Hart, Liddell B. H., Strategy : The Indirect Approach (London : Faber, 1967).
- Herken, Gregg, The Winning Weapon : The Atomic Bomb in the Cold War, 1945, 1950 (New York: Random House, 1981).
- Joshua, W. and Hahn W. F., Nuclear Politics : America, France, and Britain (London : Sage Publications, 1973).

- Kahan, Jerome, Security in the Nuclear Age : Developing U.S. Strategic Arms Policy (Washington, D.C. : Brookings Institution, 1975).
- Kahn, Herman, On Thermonuclear War (Princeton: Princeton University Press, 1959).
- Kaplan, Fred, The Wizards of Armageddon (New York: Simon and Schuster, 1983).
- Kaufmann, William W., The McNamara Strategy (New York: Harper and Row, 1974).
- Kime, Steven, "The Soviet View of War.", In Graham D. Vernon, ed., Soviet Perceptions of Peace and War (Washington, D.C.: NDU Press, 1981).
- Kolkowicz, Roman, ed., The Logic of Nuclear Terror. (Boston, Allen and Unwin, 1987).
- Leebaert, Derek, ed., Soviet Military Thinking. (Boston : Allen and Unwin, 1981).
- Lee, William T., "Soviet Military Capabilities", in Graham D. Vernon, ed., Soviet Perceptions of War and Peace (Washington, D.C. : NDU Press, 1981).
- Lockwood, Jonathan S., The Soviet View of U.S. Strategic Doctrine : Implications for Decision Making (New Brunswick, N.J. : Transaction, 1983).
- Mandelbaum, Michael, The Nuclear Question : The United States and Nuclear Weapons, 1946-1976. (New York : Cambridge University Press, 1979).
- MccGwire, Michael, "Soviet Strategic Weapons Policy, 1955-1970" in Michael MccGwire, Ken Booth and John McDonnell, eds., Soviet Naval Policy : Objectives and Constraints (New York : Praeger, 1975).
- Millett, Stephen M., Soviet Perceptions of Nuclear Strategy and Implications for U.S. Deterrence (Ohio : Battelle, 1981).
- Newhouse, John. War And Peace in The Nuclear Age (New York : Alfred A. Knopf, 1989).
- Nurick, Robert, ed., Nuclear Weapons and European Security (Survey : International Institute for Strategic Studies, 1984).



- Osgood, Robert, Limited War : The Challenge to American Strategy (Chicago : Chicago University Press, 1957).
- Panakal, Thomas. Abolition of War (Montreal : Freedom and Peace Publication, 1991).
- Pringle, Peter and Arkin, William, SIOP : Nuclear War from the Inside (London : Sphere, 1983).
- Rowen, Henry, "The Evolution of Strategic Nuclear Doctrine" in Lawrence Martin, ed. Strategic Thought in the Nuclear Age (London : Heinemann, 1979).
- Scheer, Robert, With Enough Shovels : Reagan, Bush and Nuclear War (New York : Random House, 1982).
- Schelling, Thomas C., The Strategy of Conflict (Cambridge : Harvard University Press, 1960).
- \_\_\_\_\_, Arms and Influence (New Haven : Yale University Press, 1966).
- Scott, William F. and Scott, Harriet Fast, "Soviet Perceptions of U.S. Military Strategies and Forces", in Graham D. Vernon, ed., Soviet Perceptions of Peace and War (Washington, D.C. : NDU Press, 1981).
- Sokolovsky, V.C., Soviet Military Strategy (New York : Crane, Russak, 1975).
- Trofimenko, Genrikh, The U.S. Military Doctrine (Moscow : Progress Publishers, 1986).

#### Articles

- Arnett, Robert L., "Soviet Attitudes toward Nuclear War : Do They Really Think They Can Win?", Journal of Strategic Studies (London), 2, 1979, pp. 172-191.
- Aron, R., "The Evolution of Modern Strategic Thought" in Problems of Modern Strategy I, Adelphi Paper 54 (London : International Institute for Strategic Studies), February, 1969, p.7.
- Ball, Desmond, "Targeting for Strategic Deterrence", Adelphi Paper, No. 185, Summer 1983.
- Brown, Thomas A., "Number Mysticism, Rationality and the Strategic Balance", Orbis (Philadelphia) 21:3, Fall 1977, pp.479-96.

- Chester, Conrad V., and Wigner, E.P., "Population Vulnerability," Orbis, 18:3, Fall 1974, pp.763-79.
- Douglass, Joseph D., Jr. "Soviet Nuclear Strategy in Europe: A Selective Targeting Doctrine." Strategic Review 5, 1977, pp.19-32
- Ermarth, Fritz, "Contrasts in American and Soviet Strategic Thought." International Security 3, 1978, pp.138-155.
- Friedberg, Aaron L., "A History of U.S. Strategic 'Doctrine', 1945 to 1980." Journal of Strategic Studies 3:3, 1980.
- Garthoff, Raymond L., "Mutual Deterrence and Strategic Arms Limitation in Soviet Policy," International Security (U.S), Winter 1979-80, pp.117-139.
- Garwin, Richard L., "Will Strategic Submarines Be Vulnerable?", International Security, Fall 1983.
- Hanson, Donald W., "Is Soviet Strategic Doctrine Superior?", International Security 7:3, Winter 1982-83, pp.671-683.
- Howard, Michael E., "On Fighting a Nuclear War," International Security, spring 1981.
- Kemp, Geoffrey, "Nuclear Forces for Medium Powers", Adelphi Paper No. 107, 1974.
- Lambeth, Benjamin, "Uncertainties for the Soviet War Planner.", International Security 7:3, Winter 1982, 83, pp.139-166.
- Meyer, Stephen M. "Soviet Theatre Nuclear Forces", Adelphi Paper No. 188, Winter 1983/4.
- Miller, Mark E., "Soviet Strategic Thought : The End of an Era?", International Security Review, 5:4, 1980-81.
- Richelson, Jeffrey, "Population Targeting and US Strategic Doctrine", The Journal of Strategic Studies, March 1985, pp.5-21.
- \_\_\_\_\_, "Soviet Strategic Doctrine and Limited Nuclear Operations : A Metagame Analysis." Journal of Conflict Resolution (London) 23, 1979, pp.326-336.
- Rosenberg, David A., "American Atomic Strategy and the Hydrogen Bomb Decision." Journal of American History 66, June 1979.

....., "The Origins of Overkill : Nuclear Weapons and American Strategy, 1945-1960". International Security 7:4, Spring 1983.

....., "A Smoking Radiating Ruin at the End of Two Hours : Documents on American Plans for Nuclear War with the Soviet Union, 1945-1955." International Security 6:3, Winter 1981-82.

Sienkiewicz, Stanley, "SALT and Soviet Nuclear Doctrine.", International Security 2, 1978, pp.84-100.

Steinbruner, J.D., and Garwin, T.M., "Strategic Vulnerability : The Balance Between Prudence and Paranoia," International Security, Summer 1976.

Trofimieko, Henry A., "Counterforce : Illusion of Panacea.", International Security, 5:4, 1981. Wells, Samuel F., "The Origins of Massive Retaliation." Political Science Quarterly (London) 96:1 (1981).

#### Newspaper Articles

Austin, Anthony, "Moscow Expert Says U.S. Errs on Soviet War Arms.", New York Times (New York), 25 August 1980, p.2.

Beecher, William, "Major War Plans Are Being Revised By White House.", New York Times (New York), 5 August 1972, pp. 1,9.

Finney, John W., "U.S. Says It Is Retargeting Some Missiles Under A New Strategic Concept." New York Times (New York), 11 January 1974, p.6.



1458