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HISTORY OF THE STRATEGIC ARMS COMPETITION 1945–1972

Part II

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HISTORY OF THE STRATEGIC ARMS COMPETITION 1945 -1972

PART II

ERNEST R. MAY
JOHN D. STEINBRUNER
THOMAS W. WOLFE

ALFRED GOLDBERG
EDITOR

OFFICE OF THE SECRETARY OF DEFENSE
HISTORICAL OFFICE
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Chapter XI

AMERICAN STRATEGIC PROGRAMS, 1961-70: THE IMPOSITION OF POLICY CONTROL

From an American perspective, September 1961 was decidedly a low point in U.S. relations with the Soviet Union. The Bay of Pigs, the Laos crisis, and the difficult summit meeting in Vienna were in the immediate background and provided the formative experience of the new Kennedy administration. Pressure in Berlin--most sensitive measure of tension in Europe--had reached the highest levels since 1948. The Berlin Wall was under construction; the West German government was writhing in frustration; and Khrushchev's threat unilaterally to alter the status of the city cast the dark shadows of ultimatum over the remaining months of the year. High tension also prevailed in one of the few arenas which exceeded Berlin in sensitivity--nuclear testing. Executing what was obviously an elaborately prepared plan, the Soviets renounced a moratorium on testing in late August; on the first of September they began the most intensive series of weapon tests of the nuclear era. Through September and October the Soviets exploded nuclear weapons at a rate approaching 1 every 2 days. These atmospheric tests, involving some very high yield devices, were immediately recognized as related to missile defense. The combination of the Berlin crisis and weapon tests appeared at least as provocative and threatening as the Sputnik satellites of 1957.

The changes that had occurred in the U.S. defense posture since 1957, however, rendered the Government much less reflexively reactive to Soviet

provocation in 1961 than it had been in 1957. The status of the American ballistic missile programs and of organizational arrangements for the strategic mission, still pending in 1957, were largely decided by September 1961. At working levels, the intelligence community, no longer uncertain about the immediate Soviet threat, had reached a consensus that the United States would enjoy a large strategic advantage for the foreseeable future, not only because Soviet deployments had been proven far more moderate than once imagined, but also because U.S. strategic deployments were already programmed at a rate approaching full capacity, leaving little room for immediate intensification. Though circumspect even in internal documents, policy officials of the Kennedy administration appear to have taken secret comfort from this clarified picture of the strategic balance as they faced the crises of the moment. Their reactions--a conventional buildup in Europe well short of that required to force access to Berlin and an American test program smaller than the Soviet one in scale--suggest an underlying confidence, conscious or not.

Indeed, from mid-1961 on, despite a continuing Cold War atmosphere, the central problem of strategic policy in the United States subtly shifted from that of getting things moving--as Kennedy had so often demanded--to that of getting things under control. This involved two reasonably distinguishable and separately addressed dimensions. First, as it became incontestably apparent that the United States was outstripping the Soviet Union in strategic deployments by a substantial margin, the question inevitably arose: How much strategic capability would be enough?[1] Though no final answer to the question was found, efforts to contain the impressive momentum of the U.S.

strategic program began to develop by mid-1961 and increasingly became the main thrust of U.S. policy on force size. Second, as strategic forces were actually deployed, large and exceedingly complex organizations* emerged to operate them. Conflicts in strategic logic and the complexities of strategic force operations made it difficult to guarantee central policy direction during nuclear war or even intense crisis. Because of the potential consequences of ineffective control, this issue compelled attention.

The conflicting pressures imposed by these separate dimensions of the strategic program focused most sharply on the Secretary of Defense, Robert S. McNamara, who became the major figure of the period. The development of the American forces can best be understood from his institutional perspective.

The Politics of Constraint

Force Size as a Central Problem

As suggested previously,** the initial thrust of the Kennedy administration defense policy represented the culmination of the American reaction to Sputnik and came largely from the initiative of the President himself, riding the momentum of established strategic programs. As noted, Kennedy's State of the Union message of January 1961 and his special message on defense in March provided incremental increases both in the rate of procurement and the ultimate size of the strategic missile programs. In addition,

* See below, pp. 601-605, 607-609.
** See above, pp. 424-25.

immediately after taking office the President ordered a special review of NATO policy by an ad hoc task force under Dean Acheson. The report of the Acheson group, officially issued as NSAM 40 on 24 April 1961, adopted as national policy the major principles of strategy developed by RAND analysts: U.S. strategic forces should be sized and designed for second strike counterforce; they should be prepared to conduct precisely defined counterforce operations on second strike to minimize the possibility of a full destructive urban/industrial exchange and to maximize the credibility of United States defense guarantees to other nations; U.S. strategic forces should have sole responsibility for nuclear deterrence for NATO; other nuclear forces in the Alliance should be discouraged; conventional attack in Europe and elsewhere should be met with a conventional response.

As incoming Secretary of Defense, McNamara had responsibility for the basic machinery of defense policy, but he was not the primary architect of these early initiatives. The main impetus for the missile increases came from Kennedy's campaign and the transition period studies.* The strategic principles of Acheson's report came chiefly from RAND, and McNamara, with little strategic background, was being exposed to them at the same time as the report was passing through the NSC process. McNamara spent his early months in the Pentagon impressing his presence and strong leadership style on the vast bureaucracy, creating the managerial apparatus which came to be known as planning-programming-budgeting (PPB), and learning to mesh politically with an active, strong-minded White House.[2]

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*McNamara did suggest the increase in the POLARIS program in a short note to the President on 28 January, a few days before the State of the Union Address. This appears to have been more a matter of associating himself with the spirit of the address, however, than actually reflecting his own initiative.

Much of the content of policy--both force structure and strategic principle--was inherited.

The defense policies of Kennedy's first 6 months, as expressed in the supplemental requests, produced only limited changes because they were necessarily adjustments to existing programs and budgets rather than new departures. The main channel of strategic policy on force size was the budget preparation process, through which policy decisions affected weapon development and deployment. The planning cycle for the FY 1963 budget--the first fully prepared under the executive authority of the Kennedy administration--began in the late spring of 1961. To support major decisions by the Secretary of Defense, OSD analysts drafted the critical planning document on strategic forces--the Draft Presidential Memorandum (DPM)--in September.[3] It was at this point that the Administration most seriously confronted the issues of strategic policy, and for the first time McNamara occupied the central policy position.

It is significant that the budget planning schedule brought about the Secretary's review just as the character of the existing Soviet threat was clarified and sharply downgraded, for this coincidence helped give scope to instincts for constraining the buildup of the U.S. strategic forces which McNamara seems to have already harbored.[4] In early February, for example, he had unofficially doubted the existence of a missile gap. For expressing such a judgment of the strategic balance before the President was prepared to do so, he had received a mild rebuke from the White House.* In April, he had successfully resisted the attempts

*Henry Glass, who was an aide to McNamara at the time and was well informed on the subject of the missile gap controversy, recalls that displeasure at the White House was sufficiently great to commission a special report (never actually completed) done under White House (Cont'd)

of the House Armed Services Committee, and particularly its chairman, Carl Vinson, to include a major bomber procurement program in the FY 1962 budget. He had also denied Vinson's request that he program more POLARIS submarines than the 29 already authorized under the accelerated schedule.[5] In August, McNamara resisted an attempt by Secretary of Labor Arthur J. Goldberg to persuade Kennedy to make further increases in the MINUTEMAN production rate. On that occasion, he argued pragmatically that under the already accelerated schedule MINUTEMAN production was running too far in front of the final development phase, but he also explicitly raised the question of total force requirements.[6] By September, using the budgetary channel, which gave him preeminent leverage, McNamara actively began to contain the growth of the U.S. strategic forces.

The ultimate size of the U.S. strategic forces was the central strategic problem in September 1961. The 5-year force projections required under the new PPB procedures forced the Services to be specific about their intentions, with striking results. The Air Force budget submission, which assumed a constant POLARIS program (i.e., 29 submarines), projected more than 3,000 land-based ICBMs and a major deployment of the B-70 bomber (150-200) for an armed reconnaissance mission.[7] Though still inclined toward relatively modest strategic programs, the Navy nonetheless rose to the challenge and forwarded a plan for a fleet of 45 POLARIS submarines, a 50% increase in the previously authorized force.* If fully

(Cont'd)
supervision on the actual state of affairs. This was interpreted as an exercise to bring McNamara into line with Kennedy's public position, but it was soon overtaken by events. At the White House, the Assistant for National Security Affairs, McGeorge Bundy, expressed his view in March that "the phrase missile gap is now a genuinely misleading one, and I think the President can safely say so."(TS) Memo, Bundy to Theodore Sorenson, 13 Mar 61.
*The high Service projections were prepared under the influence of the [redacted] which projected a Soviet deployment schedule roughly equal to the programmed U.S. forces.
estimate

[redacted]

implemented, these plans would have given the United States approximately 4000 strategic missiles by 1967 and a bomber force of 800-900 aircraft (not including reconnaissance) at a 5-year cost of $50 billion. That seemed excessive to McNamara. Moreover, a number of the early systems being rushed into operational deployment before their technical development programs had fully matured--notably Minuteman I, Titan I, and Polaris A-1--would require major retrofit programs. The revised estimates of the Soviet threat, the inconsistency in Service planning assumptions, and the impending obsolescence of the early missiles all encouraged a major policy judgment on the appropriate size of the strategic forces.

Such stimulus proved ample for the Secretary of Defense, and the strategic force projections which emerged from his review of the Service budget requests unmistakably evinced a strong impulse for restraint. Not only did he significantly reduce the strategic programs of the Services, but his reductions were selective, favoring the Navy, with limited strategic force aspirations, over the expansionist Air Force. Specifically, McNamara relaxed his tentative April position and agreed to include 6 additional POLARIS submarines in the FY 1963 budget. He trimmed the Navy's 5-year force projection, but only by a modest 10% to the nearest submarine, i.e., from 45 to 41. By contrast, he slashed the strategic programs of the Air Force, shutting off almost completely further growth in the core elements of its forces. No new bomber procurement was included in the FY 1963 budget or in the 5-year plan, and the B-70 program was continued in airframe status. McNamara reduced to 100 the mobile MINUTEMAN deployment which the Air Force had projected at 300 missiles and added only 100 hardened and dispersed MINUTEMAN missiles to the

5-year program to compensate. He rejected entirely the Air Force plan to add 1,800 fixed-site MINUTEMAN missiles to the previously authorized program (800) by fiscal year 1967. Though more than 2,700 strategic missiles were programmed for the Air Force through fiscal year 1967, more than half of these were the air-launched HOUND DOG and SKYBOLT* missiles. Finally, the Air Force strategic budget for fiscal year 1963 fell to 20% below its request.[9]

These decisions made a political battle virtually inevitable. The restrictions imposed did not affect the large baseline force previously programmed; thus the full impact would be felt only after 1965. In the meantime, the strategic forces would grow at a rapid rate, conferring on the Air Force a flow of financial resources that might be translated into political leverage. Amply warned, the Air Force leadership had up to 3 years in which to break the scheduled restrictions in order to sustain growth in their strategic program. They were impelled to attempt to do so, moreover, by a powerful combination of motives--organizational interest and genuine conviction that a vigorous and expansive strategic forces program was essential for national defense. Hence, to persist in a policy of constraint, McNamara needed more than managerial instincts and the natural advantages of the budget process; he needed a well-buttressed political position.

Evolution of a Limiting Policy

The momentum developed by the strategic missile programs during the Sputnik reaction was not likely to be contained solely and indefinitely by direct budgetary controls. The basic technology of offensive missiles had been mastered and was unquestionably effective even at the then-current

*At this time, the number of Skybolt missiles planned was 1,150.

state of the art. Significant improvements already projected--increases in range and accuracy, targeting flexibility, and multiple warheads--would substantially increase effectiveness. The costs, moreover, though impressive, were not unmanageable, particularly in an expanding economy which valued high technology. Successive generations of the major missile programs might be expected to meet cost-effectiveness criteria, and even the most willful and powerful of Defense Secretaries would have difficulty standing in the way of a feasible technical revolution.

Beyond that, the principles of nuclear strategy, which had the sanction of national policy, which had acquired hegemony in the defense intellectual community, and which had assumed increased prominence under PPB procedures, tended to encourage an expansive strategic program. The doctrine of second strike counterforce* offered ready justification for qualitative improvements in individual missile systems--particularly accuracy and targeting flexibility--and yielded no obvious natural limit on overall missile deployments. To sustain the policy of restraint, therefore, the logic of the situation required some redefinition of the issues, some more viable ground from which to exercise political leverage.

*As noted in Chapter IX, proponents of this doctrine in 1961 generally argued that the United States in case of war should retaliate against prior attack, not by striking at the urban/industrial structure of the attacker, but rather at his residual military forces. The purpose of the doctrine was to extend deterrence downward to lesser levels of conflict. The doctrine held that as long as an attack on the urban/industrial United States remained significantly below the full damage potential of the attacker there would be a rational incentive to avoid such targets in retaliation in hopes of preserving some restraint and ultimately of terminating the war before full-scale destruction had occurred.

Intuitively, McNamara seems to have grasped this logic in the fall of 1961 as he signaled his intentions,* for the basic elements of a limiting policy which gradually developed over the ensuing 4 years were already present at that time. In essence, this policy imposed sharp constraints on the technically more vulnerable weapon systems--notably the offensive bomber and the various programs for strategic defense--and used these to effect modifications in the established principles of strategy. Qualitative improvements in the offensive missile force were allowed as a substitute for further increases in force levels. The outcome of McNamara's policy was a strategic program whose basic force components--the number of bombers, ICBMs, and SLBMs--were stabilized along the lines projected in the fall of 1961.

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*As is well known, Robert McNamara was distinguished as Secretary of Defense by the extent to which he applied explicit criteria of economic efficiency to decisions on strategic force posture. His annual statements on military posture to the House and Senate Armed Services Committees provide detailed explanations of the major decisions on force posture made during his tenure. The testimony of his closest associates confirms that his day-to-day behavior was consistent with his public statements, and there is no indication of private thoughts to the contrary.

Nonetheless, the discussion which follows gives less emphasis than he did to the explicit logic of his policies and rather more emphasis to the consequences of his actions in the political and organizational context of the times. The underlying proposition is that the political and organizational consequences of McNamara's strategic policies had a strong effect on the evolution of the U.S. strategic posture, whether or not he was fully conscious of and influenced by these consequences. His conscious state of mind is not the central question; a full explanation of the events which occurred is.

It is clear that in the later stages of his tenure McNamara became quite aware of the political and organizational significance of the policies which he had evolved, even if he still did not consider this to be the proper basis for decisions. It is reasonable to suppose that during the early evolution of his policies these dimensions, which he thought should be extraneous, were in fact only dimly perceived, if at all. And, of course, even a man maximally attuned to internal politics and organizational idiosyncracies could not have lived through the events to be described with the clarity which hindsight provides. But that presumably is the role of historical analysis--to clarify by using the advantages of hindsight.

Strategy

The governing principles of strategy were important in the imposition of restraint, not because strategic logic was a particularly powerful, direct determinant of force deployments--it was not--but rather because of the critical role such logic played in McNamara's political position. Lacking a broad public constituency, an established network of political associations, and an authoritative background in defense matters, McNamara's personal authority depended heavily on his reputation as an unusually effective manager. Whether intentionally or not, he played to this strength in giving immediate public emphasis to the techniques of program budgeting and systems analysis and to the use of explicit, quantitatively reasoned justifications for program decisions.

Though all of these methods had independent genesis, they nevertheless quickly became primary symbols of McNamara's managerial skill. His ability to absorb the results of systematic analysis--in technical and financial detail--and to present the defense program to the Administration, to the press, and to Congress with clarity and precision provided the basis for his rapid rise to prominence and the enhanced authority which accrued to him as a result. Strategic logic provided the necessary basis for rationalizing strategic force decisions, the central defense problem of the time and therefore the primary area of concern to McNamara. Hence, the conflict between the second strike counterforce principle and the emerging policy of restraint posed a significant problem.

The Draft Presidential Memorandum of September 1961 confronted this problem by defining second strike counterforce as a criterion of force size

which differed in character from both the politically weak minimum deterrence position and the full first strike option, and which implied a level of forces indeterminate between the other two. Though differing dramatically as to the nature of the objective to be achieved, both the concepts of minimum deterrence and of preemptive war--using a first strike--sought to define the appropriate size of the strategic forces in terms of a special level of damage to be imposed on the enemy. The minimum deterrence position held that the ability to impose a finite and specifiable level of damage on an enemy's economy and population would be sufficient for deterrence. Preemptive first strike required damage to an enemy's strategic forces sufficient to reduce their potential for retaliation to an acceptable level.* By contrast, the second strike counter-force doctrine, explicitly presented as an intermediate position, tied strategic deployment not to any expected outcome of war but rather to a criterion of efficient use of resources. Aware that the recently observed Soviet forces were in a soft configuration and thus vulnerable to attack, the 1961 DPM called first for retaliation

> . . . against Soviet bomber bases, missile sites, and other installations associated with long-range nuclear forces, in order to reduce Soviet power and limit the damage that can be done to us by vulnerable Soviet follow-on forces, while, second, holding in protected reserve forces capable of destroying the Soviet urban society, if necessary, in a controlled and deliberate way.10

The degree to which Soviet power was to be reduced was relative to the marginal effectiveness of the U.S. forces. A table of expected damage to

*Analysts also distinguished, as a conceptual category, preventive war, i.e., a deliberate surprise attack arising not out of any crisis but rather from an intention to disarm the opponent. This would require even larger forces. It does not appear to have been seriously considered within the Government.

various Soviet strategic targets, prominently featured in the DPM, suggested that force levels beyond those already programmed would have a relatively small destructive effect on various types of Soviet targets, (See Table 1, p. 523). Marginal, not absolute, damage was advanced as the criterion of force size.

In 1962, with strategic issues sharply joined over the B-70 and NIKE-ZEUS (discussed below), this argument intensified. The 1962 DPM on strategic forces recorded McNamara's personal judgment that the Air Force intended to procure a full first strike capability:

> It has become clear to me that the Air Force proposals, both for the RS-70 and for the rest of their Strategic Retaliatory Forces, are based on the objective of achieving a first-strike capability. In the words of an Air Force report to me: "The Air Force has rather supported the development of forces which provide the United States a first-strike capability credible to the Soviet Union, as well as to our Allies, by virtue of our ability to limit damage to the United States and our Allies to levels acceptable in light of the circumstances and the alternatives available." Of course any force designed primarily for a controlled second-strike, and for the limiting of damage to the U.S. and its Allies, will inevitably have in it to an important degree a first-strike capability. What is at issue here is whether our forces should be augmented beyond what I am recommending in an attempt to achieve a capability to start a thermonuclear war in which the resulting damage to ourselves and our Allies could be considered acceptable on some reasonable definition of the term."[11]

This judgment appealed to growing beliefs that retaliatory damage could never be held to acceptable levels and that it was dangerous and destabilizing to think so. It thus portrayed the Air Force position as extreme. McNamara set forth the alternative conception, which defined appropriate aspirations for the strategic forces in terms of economic efficiency, more forcefully and more broadly than in the previous year:

TABLE 1

Marginal Effects of Strategic Force Increases as Projected in 1961 for 1965-Percent Damage to Soviet Targets

	(Optimistic Assumptions) U.S. Force Level		(Median Assumptions) U.S. Force Level		(Pessimistic Assumptions) U.S. Force Level	
	As planned	As recommended by the Services	As planned	As recommended by the Services	As planned	As recommended by the Services
Urban-Industrial Floor space	88	88	80	80	69	69
Total Pop. Fatalities Unsheltered	43	43	33	33	25	25
Partly sheltered	35	35	26	26	20	20
Bomber bases	99	99	88	93	58	80
Support bases	97	99	52	76	7	37
Def. Suppression	76	87	38	38	7	7
Nuclear Storage	96	98	69	69	6	5
Naval	98	98	62	62	7	7
Soft IRBM	96	100	45	80	5	5
Soft ICBM	99	100	45	88	14	59
Hard ICBM	71	75	10	19	1	1

Source: Draft Presidential Memorandum on Strategic Forces, 23 September 1961.

> ... we should stop augmenting our forces for this purpose [i.e., second strike counterforce] when the extra capability the increments offer is small in relation to the extra costs.[12]

This logic did provide the coherent reason McNamara required to justify programmed force levels which, in terms of the possible outcome of war, seemed to fall between two stools. On the one hand, strategic forces programmed for fiscal years 1963-67 were far larger than required to impose, with high confidence and in retaliation, the maximum damage on the Soviet urban/industrial structure that it was physically practical to produce.* Urban/industrial damage was the announced objective of what McNamara later labeled "assured destruction." Only a small percentage of available forces, varying according to warning time, were being assigned to that purpose.[13] On the other hand, as McNamara emphasized, even given the substantial U.S. lead in strategic procurement and even assuming timely U.S. preemption, the expected consequences to American society could not be driven low enough to render nuclear war a rational instrument of policy.

The intermediate and partial counterforce capability which the programmed forces offered was at least consistent with the efficiency criterion and could be defended under established strategic principles. Some such capability, it was officially acknowledged, would be required to strengthen defense guarantees to allied nations, to hedge against the catastrophe of general war developing from modest failures of deterrence, and to resist threats too limited to warrant consideration of massive retaliation. Moreover, since the marginal effectiveness of the U.S. forces would decrease further as the Soviets began hardening and dispersing their ICBM force, as intelligence in the fall of

*Urban/industrial damage was usually calculated as the percent of total Soviet industrial capability that would be destroyed. (See Table 1, p.523)

1962 indicated they were doing, second strike counterforce could be expected to become a progressively stronger justification for constraints on force size.

The attempt to dominate the reasonable middle ground and depict proponents of larger strategic forces as extremists in search of an inaccessible and intrinsically dangerous first strike capability did not succeed. To be sure, there existed within the Services--particularly the Air Force--some sentiment for massive preemptive attack against counterforce targets. This had been articulated by the Hickey study (NESC 2009)* in 1959 and found expression in the war plans (SIOP-63) which presented preemptive attack options and listed them first.[14] In terms of strategic logic, however, the emphasis on preemption reflected continuing concern with the vulnerability of strategic forces and the problems of force operations. By 1962, sophisticated advocates of larger strategic forces were making a far more subtle argument than deliberate preparation for preemptive war and were moving into the reasonable middle ground.

While conceding that the marginal effectiveness of U.S. strategic forces would decline relative to their marginal cost, advocates of larger forces suggested that the absolute value of feasible marginal improvements might nevertheless be high and well worth the costs involved. The destructive power of each thermonuclear weapon was so large, they argued, that even small numbers of these weapons potentially carried the fate of millions of lives. Hence, small reductions in the weight of an enemy attack might have enormous significance; and, since the success of deterrence could

*See above, pp. 463-66.

not be guaranteed beyond question, such potential significance could not be ignored. This line of argument supported the conception of a damage-limiting strategic objective in addition to assured destruction, and by 1962 the more compelling arguments for increases in the programmed forces centered on this objective.

The development of the damage-limiting conception forced both curtailment and further development of McNamara's strategic logic as it applied to force size. In resisting the objective and its implications, he increasingly restricted the rationale for the strategic forces to what he referred to as the assured destruction mission--deterrence of a major nuclear war by forces capable of undertaking such heavy destruction of an aggressor's population and industry that the continued functioning of his society would be unlikely. As McNamara put it in a typical formulation in February 1965:

> The first of these capabilities (required to deter potential aggressors) we call assured destruction; i.e., the capability to destroy the aggressorsas a viable society, even after a well-planned and executed surprise attack on our forces.15

This conception justified excess strategic capability as a form of insurance that would permit performance of the retaliatory mission on such a scale and/or under such extremely unfavorable and unlikely circumstances of prior attack that the solidity of basic deterrence could not be shaken. Beyond that, McNamara gradually developed the argument, present in his congressional testimony in 1963 and much more prominent in subsequent years, that meaningful damage-limiting capability was precluded not only because of unfavorable conditions for marginal investment in strategic forces but also because the Soviet Union could be expected to preserve its deterrent posture by offsetting any significant change in United States capability

beyond the programmed force.[16] These themes were quite important as the policy of constraint developed, but they are best considered not in the abstract but rather in the context of the major force programming decisions on bombers, strategic defense, and qualitative force improvements.

Bombers

In 1961 the Air Force found itself caught in a conflict between deep organizational commitments to the strategic bomber program and fundamental conditions of technology. The bomber force was the core of the Air Force, the weapon around which the Strategic Air Command and, to a large extent, the Air Force itself, had been organized. Bomber operations were central to Air Force traditions, to the Service's career development patterns, and to its self-image--intangibles which could not be quantitatively analyzed but which had powerful influence. Despite its organizational importance, however, the strategic bomber was being left behind in the surge of military technology. As a decade of analysis had demonstrated, bombers on the ground were highly vulnerable to the effects of nuclear explosion and dependent on a fragile warning network to escape from under attack. The short flight times of ballistic missiles, which even in the early 1960s were sufficiently accurate to attack airfields, drove the problem of warning and response up against the limits of feasibility. That translated into operational complexities and inevitably high costs for maintaining alert postures.

At the other end of the mission profile there existed the problem of penetrating Soviet airspace to reach targets. Developments in radar, automated information processing, and surface-to-air missiles with nuclear warheads rendered the traditional high-altitude bomber mission increasingly

uncertain. The Soviets had not yet mastered these techniques to produce a fully integrated capability, and SAC planners remained highly confident that until then SAC bombers could reach their targets. Nonetheless, the Soviet commitment to air defense had been thoroughly demonstrated, and their ultimate success was a reasonable expectation. The bomber of the period labored against the technical trend.

The SAC bomber inventory (aircraft possessed) at the end of 1961 consisted of some 800 B-47's and 550 B-52's. The B-58, still entering the inventory in small numbers, was a technically marginal aircraft which could not be the mainstay of a modern force. The B-47, down from a peak inventory of more than 1,300 at the end of 1958, was due to phase out completely by 1966. B-52 production was scheduled to stop in 1962 (as was B-58 production), when the inventory would reach a peak of approximately 630.[17] The significance of this date was appreciated within the Air Force and its supporting technical community; they exerted strong pressure to begin procurement of two new weapon systems on which the future of bomber operations was thought to depend--the B-70 and the SKYBOLT missile.

This situation offered important leverage to McNamara in pursuing the policy of restraint. The technical character of the B-70 and SKYBOLT programs made them both unusually vulnerable to the critical review of his systems analysts, and neither system commanded much support in the broader scientific community. In promoting both systems, the Air Force had less political support than for the MINUTEMAN program, and strong constraints would be easier to impose. Once imposed, moreover, such constraints could be expected to have an indirect effect on the size of MINUTEMAN deployments, for the Air Force could be counted on to struggle

to maintain a balance in the strategic program that would preserve the role of the bomber. This logic does not appear to have been starkly formulated in advance, but in struggling for a strong position during 1962 McNamara did come to stake a great deal on ultimately successful resistance to new bomber deployments, and his actions gradually assumed the character of a deliberate finesse.

The problems of the B-70 had been locked into its technical design by the time the policy confrontation over its deployment occurred. The original sets of requirements against which program designers had been instructed to work were extremely demanding. A May 1954 development plan for weapon system 110A, projected as the successor to the B-52, called for an unrefueled radius of 4000 nautical miles minimum and 5500 nautical miles with refueling. With a cruising speed of mach 0.9 or better at 40,000 ft. the plane was to penetrate enemy territory at 60,000 ft. and have a capability of sustaining supersonic dash (mach 2 or better) over 3000 nautical miles.[18] Payload was to be 10,000 lbs., and the plane was to be available in 1963. So stringent were these requirements that for several years thereafter designers struggled with schemes for nuclear propulsion because of the energy concentrations that such performance standards demanded.* After running through a series of impractical designs, the competitive contractors--Boeing and North American Aviation--who strongly preferred to design the plane for a single speed, hit upon the idea of using high energy boron fuels to achieve supersonic speed across the entire range, and the stated requirements were changed accordingly. Finally,

*Nuclear propulsion was pursued in a separate weapon system development program (WS-125).

North American learned of the compression lift principle* developed at NASA, and on that basis designed a mach 3 aircraft to fly intercontinental range at 70,000 ft. altitude with conventional fuel. When Sputnik brought about an acceleration of strategic missile programs, the Air Force telescoped established review procedures for the B-70 to award North American the contract in January 1958, immediately assigned a 1-A priority to the program, and accelerated its deployment schedule by 18 months to August 1964.[19]

To sustain flight at mach 3 speeds, critical parts of the B-70--its wings, flight control systems, and engines, for example--would have to operate at temperatures far exceeding previous experience. That, in turn, required esoteric materials and further development of most of the component technologies, ensuring that the aircraft would be very expensive--at least $10 billion for a 500 bomber force according to the minimum contemporary estimate and quite conceivably twice that in the end. Moreover, the plane would have to fly at very high altitudes, and since the design happened to have a very high radar cross-section as well, its approach to the Soviet Union would be readily detected. The successful Soviet attack on the U-2 in 1960 did not augur well for such a configuration.

The Eisenhower administration resisted the B-70 as an expensive weapon inferior to missiles in vulnerability and performance and entering the inventory later than ATLAS, TITAN, MINUTEMAN, and POLARIS. As with the

*At supersonic speeds, the air under the wing of an aircraft is highly compressed by the sonic shock wave. A suitably designed aircraft can climb on top of the sonic shock wave and thus experience highly compressed air under the wing and much lower pressure air above it. This translates into substantial fuel economies.

missile programs, however, the Eisenhower administration yielded to political pressures, this time from a House Armed Services Committee narrowly but powerfully reflecting Air Force and industry interests. Eisenhower approved a minimal $75 million for the program in the FY 1961 budget--just enough for one or two prototypes--but Congress voted $190 million beyond that. Just before the 1960 election--perhaps with California voters in mind--Eisenhower released $155 million of the excess appropriation, enough at that stage of the program to support development on a schedule which would sustain Air Force aspirations.[20]

Kennedy's enthusiasm for expanding U.S. strategic strength did not extend to the B-70. In his special Defense message in March 1961 he reiterated the criticisms of the weapon which Eisenhower had made and reduced its FY 1962 budget allocation to $220 million from the $358 million requested by Eisenhower in January. Again Congress appropriated substantially more ($400 million total) than requested, but McNamara did not release the $180 million add-on money despite continuing congressional pressures, including the personal intervention of the House Armed Services Committee chairman, Carl Vinson. This set the stage for a major fight in the spring of 1962.[21]

In preparing the FY 1963 budget the Air Force changed the conception of the B-70 program to remove it from direct competition with the major strategic missiles. It defined an armed reconnaissance mission (and the bomber was renamed the RS-70 for reconnaissance/strike) for conducting efficient mop-up operations after the main weight of attack had been delivered and for attacking initially targets which were too small or too mobile, or whose position was too imprecisely known to be attacked

with ballistic missiles.[22] This was a plausible justification, for the mission could be quite important and was well beyond the state of the art for reconnaissance satellites and ballistic missiles.

In resisting this altered conception of the 150-plane, $10 billion Air Force procurement program, McNamara brought the full weight of analysis to bear. Using quantitative detail prepared by OSD analysts, he pointed out in a detailed press release that the properties of the aircraft for all the expense entailed did not contribute much to the mission described. The vulnerability to ground attack and to detection was reiterated, as was the failure of the design to incorporate stand-off missiles, thus requiring penetration all the way to a gravity bomb release point.[23] McNamara argued that achieving the projected 600-foot CEP of the aircraft, while not beyond aspiration for subsequent generations of ballistic missiles, depended on electronic navigation equipment which would have to be far more complicated and more reliable than missile guidance systems. Moreover, he argued, the reconnaissance element of the mission presented such impressive problems of information processing, display, analysis, and decision-making as to make it exceedingly unlikely that the envisaged RS-70 would in fact be able to attack targets whose position had not been previously determined.*[24] Unstated but hovering in the background remained the question of whether it was desirable to allow the plane such discretion even if its technical

*At 70,000 ft and 2,000 mph, the RS-70 would scan 100,000 square miles per hour. In order to recognize small and/or mobile targets, high resolution systems would be required and the area coverage rate might better be stated as 750 million square feet per second. To process and analyze information at that rate with accuracy sufficient to allow the crew, moving at speeds up to 30 miles per minute, to identify a previously unknown target and initiate attack before moving out of range was a feat well beyond the state of the art.

accomplishment did become conceivable. In all, McNamara's argument put the B-70/RS-70 back into competition with the missile programs and drew a rather decisively unfavorable comparison.

McNamara's actual decision, however, stopped one step short of being decisive in its immediate effect. He did not cancel the program. Though he removed from the FY 1963 budget funds for procurement of the RS-70, he did provide funds for a continuing development effort to produce 3 prototypes, and he left the question of eventual deployment open for determination in future years.[25] It is not clear whether this pause at the penultimate point reflected genuine uncertainty, the natural tendency to delay difficult decisions, a strategy of gradual strangulation, or simply the political necessity of securing support from 3 of the 4 JCS members, and thus isolating the Air Force Chief of Staff. It is unlikely, though, that its major consequence was anticipated.

It turned out that the presence of the RS-70 in the budget provided the Air Force with a natural channel of political appeal to the receptive House Armed Services Committee, whose chairman, Carl Vinson, chose to make the issue the occasion for a major confrontation. Virtually conceding the question of substantive merit, Vinson presented the issue (as he undoubtedly saw it) as a matter of prerogative--the propriety of the Secretary of Defense and his civilian staff interfering in the exercise of the Air Force's strategic judgment and the authority of Congress over the defense program. In a Defense authorization bill voted by the committee in March 1962, Vinson restored funds for production planning and long lead-time procurement items of the RS-70 as a weapon system and "directed, ordered, mandated, and required" the Secretary of the Air Force to use

the full authorization.[26] This language directly challenged the authority of the executive branch to impound authorized funds, and it presented a major constitutional issue. Vinson left no ambiguity as to his intentions:

> If this language constitutes a test as to whether Congress has the power to so mandate, let the test be made and let this important weapon system be the field of trial.[27]

By its very nature--a potential constitutional crisis pitting the President against one of the most powerful members of Congress--the issue excited widespread political attention. Though the political pressure undoubtedly discomforted all of the principals involved, the situation could hardly have been designed better for McNamara. His systems analysts were being challenged on their strongest argument, where they could play the role of tough-minded, quantitatively informed skeptics and impose on the Air Force the burden of proof. McNamara capitalized on that advantage and issued a special public statement which presented the main results of the OSD analysis and which enhanced his growing reputation.[28] Moreover, his authority and the President's had been welded together by the way Vinson presented the issue, and both had been afforded one of the most valuable of political opportunities--a dramatic test of strength which they could win. Congress would not impeach the President on the RS-70 issue, nor would it deny him the Defense authorization. Those facts gave the Administration a decisive advantage.* Wisely, Kennedy did not attempt to humiliate an

*The situation was complicated, of course, by many other issues as relations between and within the components of the American Government always are. Vinson was perceived at the time to have the ability to block trade and medical legislation important to Kennedy's political programs. (See James Reston's column in the New York Times, 9 March 1962). His move on the Defense question, however, was vulnerable to the jealousy of another congressional baron--Clarence Cannon, chairman of the House Appropriations Committee. The practice of providing specific authorization for major items of procurement--aircraft, missiles, and ships--had just started in the previous year, and the House Appropriations Committee saw its power being challenged by Vinson. With Cannon on his flank, Vinson could not push the President very far.

opponent he would have to encounter on other issues. He had Vinson to the White House on 20 March and walked with him in the rose garden.[29] On the same day, Kennedy wrote a letter reminding Vinson that it would be unwise to attempt to direct him on a matter within the executive jurisdiction but promising to honor congressional views with another review of the RS-70 program.[30] The following day, the House of Representatives approved Vinson's motion to change the language from "directed" to "authorized." The quiet review affirmed the prior conclusions, and the excess authorization remained superfluous.

The RS-70 issue was a major political victory for McNamara and a seminal event in the emerging policy of restraint. The Air Force not only had lost the first round of the larger policy struggle, it was disorganized by the defeat. Until 1966 the RS-70 program remained alive enough to consume resources and attention and tie up Air Force loyalists in Congress. The basic conception had been so damaged, however, that the aircraft no longer represented a viable strategic program and could only interfere with the development of a mission concept and aircraft design which would. In the face of the developing Soviet air defense effort, operational conceptions of the bomber mission came to focus exclusively on low-altitude penetration along corridors which avoided some large air defense concentrations and in which those remaining were to be destroyed by the prior attack of stand-off missiles. Gradually a bomber design--the B-1--evolved around these operational principles, but it was 1970 before prototype development began. Meanwhile production lines at North American and Boeing served other programs, including the Apollo and the MINUTEMAN respectively.

The second battle over the policy of constraint centered on the SKYBOLT missile and was fought in the context of the FY 1964 budget cycle. SKYBOLT, a ballistic missile designed to be carried by the B-52 bomber force and launched from the air at targets up to 1,000 miles away, had much the same character as the B-70/RS-70: it suffered from the pre-launch vulnerabilities of the bomber force; and its technical design was being driven so hard against natural physical limits that it was destined from the start to be costly, complex, and of questionable reliability. It thus was greeted with widespread skepticism in the scientific community and was vulnerable to critical quantitative analysis.[31] Like POLARIS, SKYBOLT would be launched from a mobile platform and hence required extremely accurate measurements of the instantaneous launch position and speed. Any error in launch position would be translated directly into an error at the target, and an error in the measurement of launch speed would cumulate as a function of flight time. The critical difference was that POLARIS would be launched at around 2 knots speed whereas SKYBOLT would be launched at speeds up to 550 knots or even more. Since a given percentage error would have far greater consequences for SKYBOLT, clearly the latter's guidance system would have to operate at tolerances of 2 or perhaps 3 orders of magnitude greater than POLARIS to achieve equal performance in just this one dimension.* When

*Using calculations derived from analysis of the SKYBOLT issue done as staff work within OSD, Enthoven and Smith state that a 0.1% error in the launch speed measurement of SKYBOLT would approximate 1 foot/sec. and hence would generate a 1,000-foot error 1,000 miles downrange. A 0.1% error would produce only a 7 foot error at 2,000 miles range for POLARIS. (See Alain Enthoven and Wayne K. Smith, How Much is Enough? p.257.)

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other factors were considered--launch altitude variation; the greater structural strength required to withstand greater shock, noise, and vibration; and the slower development schedule--SKYBOLT suffered even more in the comparison. These difficulties preyed upon the program as estimates of development costs doubled and total program costs trebled between March 1960 and December 1961.

Because of scientific skepticism SKYBOLT had come into jeopardy under the Eisenhower administration, and in the fall of 1959 a DDR&E advisory committee had recommended terminating the program on technical grounds. The Air Force weathered that crisis by relaxing both the development schedule and the accuracy specification. It was also careful to claim only a restricted, specialized mission for the missile--air defense suppression--which again served to remove it from direct competition with the main ICBM and SLBM programs. SKYBOLT was thus projected as a means of upgrading the standoff capability provided by the cruise missile, HOUND DOG, which began operational deployment in 1960.

The Air Force received a major assist in March 1960 when Great Britain joined the SKYBOLT development effort as a means of preserving the utility of its nuclear bomber force. The British cancelled their ICBM program in anticipation of SKYBOLT and thereby committed themselves very heavily; this offered a powerful offset to high cost and technical difficulties.* Even

*Richard Neustadt, in his authoritative case study commissioned by President Kennedy, describes the US-British relations on SKYBOLT in detail. The original agreement in September 1960 provided for American withdrawal if the program did not define success in terms of cost effectiveness calculations. Since SKYBOLT was a major political symbol in British defense policy, the British connection brought a larger context to the program which would serve to render cost and performance competition with MINUTEMAN and POLARIS far less relevant. A published version of this case study is contained in Neustadt's Alliance Politics.

so, in the wake of another negative technical evaluation by the President's Scientific Advisory Committee, outgoing Secretary of Defense Gates withheld development funds for SKYBOLT from the FY 1962 budget, leaving FY 1961 money to be stretched over fiscal year 1962, pending reconsideration by the new Administration.

It is apparent that McNamara quickly appreciated the weaknesses of the SKYBOLT program. As early as 1 February 1961, for example, he informed the Director of Defense Research and Engineering that personal conversations with the British indicated that they might be willing to cancel SKYBOLT.[32] He also conducted a special review of the program and concluded that its cost estimates were unrealistically low. Nonetheless, in the spring of 1961 he restored the funding which Gates had deleted and thereby continued the development program under the Air Force's revised schedule. As noted previously,* in the fall of 1961 he also included 1,150 SKYBOLT missiles in the projected 5-year defense program against strong advice from the President's Science Advisor, Jerome Wiesner, the Director of Defense Research and Engineering, Harold Brown, and the Director of the Bureau of the Budget, David Bell. Though these decisions have been officially explained in terms of a simple cost effectiveness calculation which made SKYBOLT competitive for defense suppression at a cheap enough price,** and though

*See above, p. 517.

**This is the explanation offered in retrospect by then Deputy Assistant Secretary Alain Enthoven, in How Much is Enough?, p. 255. His own figures, however (pp. 258-59), tend to undermine the explanation. The defense suppression role, he notes, required an attack on about 200 targets, and he suggests that could be accomplished by the 400 HOUND DOG missiles scheduled for alert status or other missiles already programmed. If this is accepted, it is not apparent why a force of 1,150 SKYBOLT missiles would be required and how such a force could be cost effective, since it would require, by 1961 figures, $1.4 billion in procurement costs beyond the $500 million for development.

in the fall of 1961 McNamara did impose a total development cost ceiling of $500 million on the project, it is likely that by then he had a politically desirable sequencing of the bomber issues in mind. It would be easier to resist the B-70/RS-70 deployment if SKYBOLT --on which the future of the B-52 was thought to depend--remained under full development, and in terms of expense and impact on the strategic program the B-70 was seen as the more important issue.

By the summer of 1962, with the RS-70 battle behind him and the FY 1964 budget cycle beginning, McNamara was ready to terminate the SKYBOLT program, very much aware of and primarily concerned with the complex politics which attended the question within the U.S. Government. Air Force planners felt that McNamara could not sustain another major political confrontation so soon after the RS-70 not only because of the burdens it would place on the Administration's relationships with Congress but also because of the British commitment. The British had recently extracted diplomatic assurances about the missile from President Kennedy, and the Air Force could reasonably calculate that this would constrain McNamara's freedom of action on the issue.* By keeping the SKYBOLT program within the $500 million development cost ceiling through restrictions on the number of test firings, the Air

*In January 1962 in a talk about SKYBOLT's technical difficulties with British Air Minister Julian Amory, Kennedy had learned through Amory's emotional response that the British were counting on the program and that technical difficulties, unless they were absolutely insurmountable, were of little consequence. Kennedy had reassured Amory that the United States would honor the agreement the two countries had reached, and this reassurance had been reported to the British government. The Air Force would learn of such an event through close contacts with the Royal Air Force.

Force expected to ride through the FY 1964 budget preparation process, even though it was obvious that technical developments would not be achieved within the budget constraint.* The State Department followed the issue also, not only because of the diplomatic dimension but also because those dominating European policy in State saw the possible cancellation of SKYBOLT as one means of forcing the traditionally independent British into the developing arrangements for European economic and political integration. McNamara could not ally with State's Europeanists against SKYBOLT without becoming involved in a policy context extraneous to his main concerns and holding implications which might threaten his policy of restraint.**

McNamara determined to deal with the issue on the most favorable grounds--that is within the OSD budget review where SKYBOLT's cost and technical difficulties, compared with the successful POLARIS and MINUTEMAN programs, gave him the greatest leverage. In late August 1962 Charles J. Hitch, the DoD Comptroller and Harold Brown, the DDR&E, met with McNamara and together they decided that the SKYBOLT program should be terminated and excluded from the FY 1964 budget.[33] This would force the Air Force and

*Enthoven and Smith note that only 6 of the 28 test flights planned for 1962 actually occurred, although spending proceeded at the planned rate. As it was, SKYBOLT's budget at the time provided for less than half of the test flights which had been required for the far simpler HOUND DOG which SKYBOLT was to replace.

**In the fall of 1962 the State Department was busily developing a proposal for a multilateral force of ballistic missiles to be jointly armed and operated by the members of the Atlantic Alliance--the MLF proposal. McNamara resisted the idea as a marginal weapon proposal which would add little to the strategic capability of the alliance and would complicate the problem of operational control (discussed below). The MLF as an additional strategic force component would be a direct violation of the policy of restraint.

others who would oppose the decision to attempt to add the program to the budget in the process of congressional review, a far more difficult maneuver than the restoration of full funding to an already existing program, as with the RS-70.

To avoid alerting the British Government through the U.S. Air Force or the Air Force through the British Government before the decision was a fait accompli, McNamara swore his aides to absolute secrecy. Somewhat later, to compensate the Air Force for the loss of a program which had been scheduled to supply nearly half of their ballistic missiles, and perhaps hoping to diminish their resistance somewhat, McNamara added 100 MINUTEMAN missiles to the force projected for fiscal year 1968--i.e., in the last and least committing year of the 5-year plan. This increment was later taken away.

The SKYBOLT decision has been extensively and authoritatively described in the case study which President Kennedy commissioned Columbia University Professor Richard Neustadt to write.[34] As that document records, McNamara's plan for SKYBOLT cancellation achieved its purpose and more. Aided by the distraction of the Cuban missile crisis, McNamara kept the August decision to cancel the program secretly within OSD budget channels until revelation was unavoidable. The JCS--and hence the Air Force--learned of it on 5 November when McNamara sent them a draft budget for comment with SKYBOLT deleted. He secured the President's unofficial concurrence in the decision 2 days later on 7 November, before the JCS could respond and before the British were informed officially. The President cancelled the program "subject to consultation with the British" on 23 November, after receiving a 3-1 recommendation from the JCS to continue its development. McNamara,

assuming an unusual role for a Secretary of Defense, took control over subsequent negotiations with the British. Contrary to an explicit statement of policy from the State Department, he included POLARIS in a list of options for meeting the U.S. obligation to the British and signaled to the British Defense Minister, Peter Thorneycroft, that this was a possible outcome. Because of the intense British political commitment to SKYBOLT, this decision produced a crisis in U.S.-British relations which came to a head when Prime Minister Harold Macmillan and President Kennedy met at a summit conference at Nassau in December. The conference resulted in an arrangement whereby the United States, against President Kennedy's strong inclination, agreed to supply the British Government with POLARIS missiles as a substitute for SKYBOLT. This sealed the fate of SKYBOLT.

As with the B-70 issue, it is virtually impossible that McNamara could have anticipated this final phase of the SKYBOLT issue in all its implications or even that he would have attempted to work out his intentions in such detail. Nonetheless, within the limits of what it is possible to comprehend in advance, he was quite purposeful throughout the fall of 1962 as he sought to control the issue, and, in the end, he emerged with another major victory for the policy of restraint. Cancellation of SKYBOLT effectively removed the technical basis for expansion of the bomber program, thereby seriously daunting the Air Force's will to secure larger strategic deployments. With the British shift to POLARIS, the Air Force lost the diplomatic connection which just a few months previously had appeared to be ample protection for a large air-launched missile deployment. Though the Nassau conference was seen at the time as a debacle, this understanding was rooted in the context of immediate European policy. Few appreciated

in the heat of the moment the extent to which the event was an episode in larger strategic issues, with yet larger stakes attached to them.

Strategic Defense

Though the case for strategic defense had been deeply prejudiced by events of the previous decade, there was a moment in 1961 when its intrinsic appeal found response at high levels of OSD. Should high quality defense against thermonuclear attack prove to be technically and economically possible, it would obviously offer for the conduct of world political relationships a principle vastly superior to deterrence based on mutual offensive threat. Though such an accomplishment was not an immediate or foreseeable prospect, it was not inconceivable that the necessary technology might evolve with intense effort. There were grounds for preferring to drive technology in that direction rather than into ever more sophisticated offense. The core of the missile defense problem was automatic data processing, and though only dimly perceived at the time, if at all, that was where the United States held the greatest comparative advantage and where radical technical advances were impending. There existed attractions at a less global and more readily comprehensible level as well. Even a modestly effective defensive system might help protect what was emerging as the Achilles heel of the offensive forces--the command and control system. Moreover such a deployment might strengthen the influence of the Army within JCS and thus put more of an institutional brake on the strategic offensive forces. It would also provide a politically convenient match for an intense Soviet missile defense effort which loomed on the horizon. For at least some of these reasons, McNamara

and his civilian advisors in the early fall of 1961 flirted with a limited deployment of NIKE-ZEUS.

The moment was a fleeting one. NIKE-ZEUS technology, flawed and unstable, could not sustain even a limited deployment decision against opposition which developed around the President. By the time the technology had evolved to a more plausible state, resistance to an ABM deployment had become a centerpiece in McNamara's policy of resisting further increases in the offensive forces. And despite the limited deployment decision in 1967, which constituted a significant political defeat for McNamara, a serious ABM deployment was eventually prevented by other means and other men. There is irony in the denouement, for the ultimate means of constraint--a formal but limited arms control agreement with the Soviet Union--if admitted as a possibility earlier, might have made the entire sequence run in favor of rather than against missile defense. For the moment, however, the problem is to understand why the events occurred as they did.

The NIKE-ZEUS system, one of the many technical developments accelerated in reaction to Sputnik, had been budgeted for about $1.2 billion from fiscal year 1955 through fiscal year 1962. From the outset, however, it had suffered from technical competition with the offensive missile programs, and the Eisenhower administration successfully resisted early commitments to deployment. The system under development was organized into batteries each containing the following equipment: 1 discrimination radar; 6 target track radars; 12 missile track radars and 96 interceptor missiles. A major city would be defended by 2 or more batteries which would be coordinated by a decision center with a large acquisition radar to detect incoming missiles and allocate them to

a battery. The Army proposed a deployment of 29 defense centers and 70 batteries* to protect 27 major cities at a 5-year cost of $7.8 billion for fiscal years 1963-67.[35]

Technical analysis in 1961 indicated that until its supply of interceptors was exhausted a NIKE-ZEUS battery could defeat up to 14 warheads per minute of the type then operational on ATLAS and TITAN I, and also those projected for the first 150 MINUTEMAN and the first 300 POLARIS missiles. These early reentry vehicles were very blunt and presented a large radar cross-section; hence they could be rather easily detected, tracked, and discriminated from other objects. Designed for the earliest possible operational deployment of the first generation missiles, they did not take advantage of progress in weapon design which would allow much sleeker reentry vehicles with smaller radar cross-sections in the next generation of U.S. ICBMs and SLBMs. The TITAN II reentry vehicle would reorient itself in flight so as to present to ground-based radar the minimum radar cross-section, and the POLARIS A-3 would present multiple targets, each with reduced radar visibility.[36]

Even these rather modest and virtually assured offensive missile developments were enough to burden NIKE-ZEUS beyond the point of practicality. The problem had to do with inherent trade-offs among (1) the range of target discrimination, (2) the capability and complexity of the radar required, and (3) the area afforded protective coverage. To reduce the burdens on the radar--the most expensive and technically demanding of its components--NIKE-ZEUS used the atmosphere to discriminate incoming warheads from decoys. It was believed that decoys which were undistinguishable from live warheads down to 200,000 ft (33 n.mi.) could

*These batteries were approximately one-half the size of the batteries previously mentioned.

be constructed at around 2% of RV weight and thus could be used in large numbers. Since ZEUS target detection and assignment would occur at 200 nautical miles out and would require 20 seconds, the launch of the interceptor would occur when the warhead reached 120 mile range. Given the 25-second flight time to the point of intercept, that dictated a range of only 20 n. miles and a radius of protected area of only 10 n. miles. Obviously, the presence of rather simple decoys--particularly if dispersed in space--would force a high-quality ZEUS defense to waste a large number of interceptors on decoys. As an ARPA staff report in the summer of 1961 briefed to the President's Scientific Advisory Committee made apparent, even the Mark 11 warhead scheduled for the POLARIS A-3 would render NIKE-ZEUS marginal. A hypothetical TITAN II loaded with 20 warheads--all live to hedge against improvements in radar discrimination--would require 4 ZEUS batteries to defend a given city against a single attacking missile, an impracticality on the face of it.

The argument for a limited deployment included in the DPM of September 1961 acknowledged these defects but still saw sufficient advantage to justify a 12-battery system with 1200 missiles and 6 decision centers to protect 6 cities, at a projected cost of $3.6 billion for fiscal years 1963-68. Such a system, the memorandum argued, would serve to match the surprisingly intense Soviet ABM effort,* and it would be able to take advantage of errors which the Soviets were judged likely to make in designing their warheads. Beyond that, a limited ABM deployment would offer protection against lesser powers, potential blackmail, and possible accidents, and it would provide a diversion to an actual attack, judged to be valuable even at a cost exchange ratio unfavorable to the defense.[37]

*See below, pp. 558-63.

Resistance to the NIKE-ZEUS deployment developed in the process of preparing the President's review of the FY 1963 executive budget, and McNamara quickly abandoned the position outlined in the September draft of the DPM.* As he had argued to the Senate Armed Services Committee earlier in the year, the technical basis for a decision did not exist. Tests of a NIKE-ZEUS prototype against ATLAS missiles fired from Vandenberg AFB were scheduled at Kwajalein for 1962 and would provide the first concrete evidence on the effectiveness of the system.[38] Even in advance of those tests, moreover, it was apparent that a number of fundamental technical changes were imminent. The development of phased array radar--which steered multiple beams electronically (and virtually instantaneously) rather than propagating a much smaller number of mechanically rotated beams--was well enough in hand to anticipate major improvements in radar performance. These would include resistance to jamming, greater discrimination, elimination of target acquisition delays, and ability to perform multiple functions with a single installation. Phased array radar would remove the radar restriction on the rate of interception fire. Moreover, the developers had already conceived of the high acceleration SPRINT missile which would reduce the flight time of the short-range interceptor from 25 to 15 seconds. Both of these developments suggested an early redesign of NIKE-ZEUS and undermined the rationale for a limited deployment.[39] In the

*The NIKE-ZEUS program was reduced to a development effort with some provision for long lead time items in the October draft of the DPM--a revision effected in McNamara's own hand. As late as 13 November 1961, the Director of the Bureau of the Budget, David Bell, wrote to Kennedy arguing against McNamara's recommendation for a limited NIKE-ZEUS deployment, and Kennedy seems to have toyed with providing $100 million in pre-production funds before the negative views of Bell and the President's Science Advisory Committee (PSAC) were made known to him.

FY 1963 budget, McNamara allocated $235 million for continued development of NIKE-ZEUS.[40]

The Army responded to this position later in 1962 with a new proposal incorporating both NIKE-ZEUS and the newer technology. It had very likely sensed McNamara's responsiveness, and at any rate it felt that a principle was at stake. Since Sputnik, the major strategic programs had been following a policy of concurrency--starting production for deployment well before technical development was completed. Accordingly, as major technical advances came into sight they were treated as occasions for retrofit programs rather than delays in production. Realizing the organizational and political advantage which such procedures conferred, the Army pushed to establish concurrent development and production for its program--specifically, phased deployment of 16 NIKE-ZEUS batteries beginning in 1967 and 10 batteries of a new configuration, labeled NIKE-X, which would utilize the SPRINT interceptor and phased array radar technology beginning in 1969. Thereafter, the 16 ZEUS batteries would be retrofitted with SPRINT and the ZEUS missiles would be redistributed among all 26 batteries. The projected cost of this hybrid, not including operational costs, was on the order of $14 billion.[41]

For the 16 battery system, the Army offered a limited rationale which did not require effectiveness against the full weight of Soviet attack. With Navy support within the JCS, the Army argued that the system would provide a politically required response to Soviet missile defense activities and that a limited capability would have direct military utility:

> The absence of an anti-ballistic missile capability subjects the United States to the possibility of significant damage or public humiliation at the hands of minor powers who acquire a missile capability. Our recent experiences in the Cuban crisis stress the relevance of this concern.42

The Army lacked the weight, however, to force the issue in 1962. Missile defense had not become a major public issue, and the forums for congressional promotion were occupied with Air Force programs.* Within JCS, the Army had to struggle against Air Force low regard for missile defense and could not obtain the unanimity required for exercising strong JCS pressure. The Administration was preoccupied with other questions, and within OSD analysis of the missile defense question was not highly developed. Hence the Army proposal was evaluated in rather narrow technical terms, and the continuing doubts of the technical community provided a basis for delaying deployment. Even a small power, it was pointed out, could defeat the proposed system simply by exploding weapons outside and upwind of the protected areas. Absent a fallout shelter program, which had not been integrated into the plan, the resulting fallout could be as lethal as direct blast and thermal effects. Moreover, very large Soviet warheads tested in 1961-62 burdened the SPRINT interceptor with some of the same problems that had ruined ZEUS. Thermal effects of a large yield explosion at high altitudes--say, 10MT at 50,000 ft.

*Senator Strom Thurmond, using intelligence on the Soviet programs, attempted to force ZEUS deployment in 1963 and did manage to get $196 million voted for that purpose by the Senate Armed Services Committee. He was defeated on the floor of the Senate by Senator Richard Russell. There was some resistance to the Test Ban Treaty in 1963 on behalf of the ABM program. The argument was that further atmospheric testing was required to learn more about the interference with radar caused by nuclear explosions. The treaty was nonetheless ratified. Though these tests were obviously yet to occur in 1962, the underlying condition--that missile defense did not as yet have strong public support--was nonetheless apparent.

or even higher--would be devastating to American cities. If these effects were to be prevented, even the SPRINT interceptor would have to be committed when incoming warheads reached altitudes of 150,000 - 200,000 ft., and this would render warhead discrimination very precarious. Also, SPRINT interceptors operating against target clusters at these altitudes might interfere with each other, and this problem had not yet been analyzed. Finally, the disruption of radar by high altitude explosions was too serious to ignore, and this effect threatened even the advanced radar installations of NIKE-X. The effects, it was estimated, could be mitigated by higher radar frequencies, by increased numbers of radar, and by their physical dispersion, but these adjustments would have to be purchased at considerable cost--particularly in the burdens placed on the control network. In the face of these uncertainties, McNamara reoriented the development program in the FY 1964 budget to focus entirely on the more promising NIKE-X technology and postponed the larger issues associated with actual deployment.[43]

It required 4 years before technical development of the NIKE-X system and political impetus stimulated by the Soviet program forced a change in this interim posture and brought the question of ABM deployment to the point of decision. In the meantime, McNamara's position on the issue within the government underwent a great deal of conceptual development as the ABM question came to be related to the question of restricting the size of U.S. strategic offensive deployments.

The issue concerned the second strike counterforce doctrine as it related to force size. As noted above,* McNamara attempted in 1962 to justify the programmed U.S. forces as being just the right size to capture

*See above, pp. 523-25.

the available benefits which the doctrine promised--i.e., reduction in the weight of attack and increase in the credibility of our retaliatory response--and to portray recommended increases in offensive forces as an attempt at a preemptive first strike capability. The question of missile defense defeated this logic by introducing a clear conception of a damage-limiting objective to which offensive forces could realistically claim to make a significant contribution. If a multibillion dollar effort to reduce the vulnerability of the United States to attack was to be contemplated, then by McNamara's own managerial logic, offensive force increases would have to be allowed to compete with missile defense systems as a potentially profitable allocation of the marginal investment. Since any attempted attack on the United States was likely to be less than perfect and vulnerabilities of the U.S. command and control system would independently require a very rapid response, the second strike restrictions on the offensive forces would not be an insurmountable barrier to the damage-limiting mission.

McNamara faced this issue systematically. Following completion of a study on damage limiting by DDR&E in January 1964, he commissioned a series of studies from the Army, Navy, Air Force, Office of Civil Defense, Weapons Systems Evaluation Group, and DDR&E to evaluate the damage-limiting mission. In a memorandum to these agencies in March, Deputy Secretary Gilpatric posed two questions: First, for a given investment in damage limiting what was the "optimum allocation" among the various means of approaching the problem -- civil defense; ballistic missile defense; bomber defense; strategic offensive forces; and antisubmarine warfare? Second, what was the expected relationship between the level of investment in damage limitation and the percentage of the U.S. population surviving attack?[44]

The voluminous studies done under this mandate traced these questions through a multitude of assumptions about the opposing force structures and the conditions of attack and response. They demonstrated, of course, that there were no general answers to the questions which would hold up across all plausible assumptions, but nonetheless they created a number of impressions throughout the Government.

First, the most profitable additional investment in strategic defense up to about $5 billion dollars would be a fallout shelter program for the major urban areas. Second, a balanced* program, designed to guarantee the survival of any given percent of the American population above 50% against a given Soviet attack, would contain all the force elements considered--fallout shelters, missile defense, strategic offensive forces, antisubmarine forces, and bomber defense. The suggested level of investment for missile defense and for additional strategic offensive forces was approximately equal for the second strike scenarios,** ranging from $5 billion to $20 billion

*The damage limiting studies were structured in economic terms, and the conception of a balanced program (or as it was generally referred to, "a balanced investment") was an application of the notion of efficient economic allocation. Thus a balanced program was one so allocated that an additional dollar spent on any of the component activities--missile defense, offensive, ASW, etc.--would produce an equal effect on the percentage of the population surviving attack. The analysis done indicated that the pertinent curves were relatively flat in the area where the optimum values appeared to be, and hence that it was not necessary to establish an exact optimum for each program. This logic is presented in the summary report on damage limiting.

**When the Soviets were conceded a completed first strike, the utility of the offensive forces declined, and U.S. declaratory policy did suggest that the forces ought to be sized against the first strike threat. The damage limiting studies gave great emphasis, however, to the argument that the mere presence of U.S. offensive forces would compel an attacker to allocate his weapons away from urban-industrial targets, a concept labeled "virtual attrition," and would thus contribute to damage limiting even under pure first strike conditions. Moreover, the realities of operational conditions made it extremely unlikely that an attack and response would be as neatly sequenced as the first strike/second strike distinction implied. Since Soviet strategic forces were being maintained during this period at a rather low state of readiness and since U.S. forces were reasonably alert most of the time, the preponderant probability was that the United States attack would develop far more rapidly regardless of which side first made the decision to initiate war. This could not be publicly acknowledged, but it did affect the balance of judgment within the Government.

for each, depending on the level of protection sought. Third, the costs of protecting the U.S. population would increase exponentially with the level of protection sought. Assuming a U.S. population base of 200 million people, it was estimated that about 70 million people or 35 to 40 percent of the U.S. population could survive a typical Soviet attack--a fixed second strike--without any additional investment in damage limiting. Though the estimates varied widely, reflecting a great deal of uncertainty, an attempt to guarantee the survival of 50% of the population was estimated to cost about $15 billion, while the high estimates for protecting 90% of the population exceeded $60 billion. Fourth, as higher criteria of protection were adopted, the relative cost to the Soviet Union to offset the American investment would decrease. Estimates varied, but the DDR&E summary of the damage limiting studies in September 1964 argued that U.S. forces designed against the same threat could be offset at increasingly less relative cost to the Soviets once the U.S. investment went beyond a $35 billion program intended to protect about 75% of the population.[45]

The damage limiting studies created considerable potential for stimulating expansion of the strategic program. The balanced forces principle offered the basis for a natural coalition among the Services, and as long as assumptions were judiciously stated, the analysis which emerged from the studies allowed plausible justification for an increment to the strategic program large enough to accommodate such a coalition. The summary report suggested, for example, that against the typical Soviet attack, investment of $35 billion in additional damage-limiting forces might remove from jeopardy perhaps as many as 80 million American lives.

This 80 million figure represents the difference between the 35 to 40 percent survival rate base figure mentioned above and the 75% survival rate calculated for a $35 billion program. At less than $100 per life at risk for 5 years, it seemed conceivable that such an investment might be attractive to the American public, particularly since it could be plausibly argued that the total return in terms of the survival of American society would be greater than the sum of individual lives saved. The Air Force, ever the strongest advocate of large strategic forces, was alert to identify its recommended increases in the ICBM and bomber programs with the damage limiting objective. Analysis, the Air Force argued, "strongly supports recent USAF proposals for development and deployment of weapons systems." Moreover, "there was little incentive to delay decisions to improve our offensive system performance."[46] The Air Force asserted that damage to the U.S. population could be held to 15% if both sides accepted counterforce targeting doctrines and to less than 10% if both sides took care to avoid collateral damage. In short, a link was effected between missile defense deployment and further increases in the strategic offensive forces, and it became apparent that one might lead to the other.[47]

In resisting the expansionist implications of the damage limiting studies, McNamara used the basic propositions which had emerged to make two very convenient, politically useful arguments. First, he insisted that since a fallout shelter program was generally estimated to be the most profitable increment to the baseline force, that program would have to come first in any damage limiting effort. Since Congress had decimated the fallout shelter program in 1963 in response to public opinion, this condition imposed an effective political check on expansion. As long as

Congress and the public at large would not support the most valuable component of the damage limiting package, McNamara could hardly be accused of frustrating a national will for greater protection.

Second, McNamara attributed to the Soviet Union the same steadfast intent to preserve an unquestionable capability for assured destruction that he had worked so hard to establish as the prime objective of American strategy. The United States, he argued, could not seriously pursue a damage limiting program without thereby degrading the Soviet assured destruction capability. The Soviets, he contended, were certain to respond with force increases to restore their deterrent threat. That the Soviets would benefit from an increasing cost advantage as this interaction progressed--a fact which he emphasized with more pessimistic cost ratios than had appeared in the supporting studies--meant they had to be conceded the capability to offset the U.S. effort even from their smaller industrial base. This was the clearest interpretation of the Soviet program to emerge since the Air Force version of the late 1950s was belied, and it found rapid and widespread acceptance within the Government. The argument, which came as a surprise to those who had conducted the damage limiting studies, seriously undermined the entire conception of a damage limiting mission.[48]

As this line of argument emerged in 1964 and 1965 it allowed McNamara to contain the impetus for expansion of the strategic forces which might have been generated by the damage limiting studies, but it left him vulnerable on the missile defense question to the events already mentioned, which ultimately served to force a Presidential decision. Weapon designers in the United States were developing an area interceptor which would diminish the impact of both the fallout shelter argument and

the various technical objections which had prevented deployment in previous years. Moreover, the Soviet Union was beginning a missile defense deployment which served to turn McNamara's second argument back on itself. If the Soviets were certain to offset a U.S. damage limiting program, so must the United States offset theirs. McNamara was in a far better position to restrain a U.S. initiative than to choke off a U.S. response.

The area interceptor, the DM-15-X2 or SPARTAN, to be available for flight testing in mid-1968, was a rejuvenation of NIKE-ZEUS, whose first stage became the second stage of the new, enlarged missile. The range of the SPARTAN was extended to 300 n.m. from around 55 n.m. and its payload increased from 460 lbs. to 2,900 lbs. The payload increase was for the purpose of accommodating a new warhead [redacted] designed to maximize production of hot x-rays; [redacted] This combination would allow interception of incoming warheads well above the atmosphere, where the x-ray emissions would extend for hundreds of miles. Upon striking a reentry vehicle, x-rays of sufficient energy would induce structural damage as a consequence of intense and rapid surface heating. The area over which this effect would be lethal would depend, of course, on the susceptibility of the RV, but against RVs of contemporary design the lethal radius of the new warhead was estimated at 10 to 100 n.m. Against warheads hardened to resist the effect, it was estimated that the lethal radius might be reduced to 5-10 n.m.[49]

Since the atmosphere would protect the earth's surface from high-altitude x-ray emissions, the new interceptor would not itself jeopardize the American population, even without a fallout shelter program. With an

interceptor range of at least 300 n.m., each installation could protect 500,000 square miles of land area; 15 batteries with 700 missiles, it was estimated, would provide coverage of the entire United States with sufficient overlap to allow flexibility for allocating the weight of defensive effort in the midst of an engagement. Thus, by virtue of total area coverage, a bypass attack--exploding weapons upwind of cities with terminal defenses--could be defeated, and through its capacity for concentrating its effort at the moment of attack, the defense would secure the strategic advantage of having the last move. The lethal radius of the new warhead would allow large areas to be cleared of threatening objects--up to 4,000 cubic miles for each interceptor against hardened RVs ; up to 4 million cubic miles per interceptor for unprotected RVs . This would either prevent or destroy any clustering of warheads and decoys intended to saturate a terminal defense. The area defense, its proponents suggested, could be deployed in the first instance against attack by smaller powers and by unsophisticated Soviet weapons. As the threat developed, additional terminal defenses could be added to upgrade the overall capabilities of the system.

The development of the area interceptor enabled the Army to define by 1966 a much more viable version of the mixed system it had unsuccessfully proposed in 1962. The new interceptor, combined with phased array radar installations and with SPRINT missiles, would provide a reasonably credible missile defense. Moreover, the damage limiting studies suggested that a bomber defense capability could be integrated into this system at a significant but not prohibitive marginal cost ($1 to $10 billion) corresponding to damage limiting packages designed for 50% and 90%

survival respectively. This deployment would still be susceptible to saturation tactics and to radar blackout effects—to a degree that was a matter of disagreement in the technical community. Nonetheless, it made a technical claim substantially greater than any of the previous designs, and it enjoyed commensurately increased technical support, particularly within DDR&E.[50]

The ability to offer some marginally plausible answers to technical objections was important for the political status of the new missile defense design, but even more so was the awareness by 1965 that the Soviet Union was beginning to deploy a missile defense system based on the same technology.[51] Soviet missile defense activities had been identified at Sary Shagan as early as 1955 and thereafter U.S. intelligence agencies had traced the development of a warhead impact area flanked by numerous radar installations. By 1960 the Soviets had constructed at Sary Shagan a very large radar, labeled "Hen House," which was assumed without much question to use phased array techniques, and by 1961 the construction of new launching installations had suggested the advent of a new interceptor. The series of atmospheric tests which the Soviets had begun in September of 1961 included shots obviously related to an ABM system and during that series, which ran into 1962, the Soviets had tested an exo-atmospheric x-ray warhead similar in character to the U.S. design though somewhat lower in frequency [redacted] In October 1961 the Soviets had launched two SS-4 missiles from Kapustin Yar into the Sary Shagan test range and had attempted an intercept of the second through the interference of an actual nuclear explosion caused by the first. The test, repeated at [redacted]

the following year, was more sophisticated than anything that had been attempted in the U.S. test program. This ample evidence convinced many American analysts that the traditional Soviet emphasis on defensive systems would extend to missile defense.

In 1962 the beginning of construction of a large radar installation 35 miles southwest of Moscow-- labeled "Dog House" in the U.S. intelligence community--heralded the beginning of an actual ABM deployment, and in 1963 construction began on the smaller Triad* radar installations along the previously constructed SA-1 air defense ring around the city. In 1964 the interceptor for the system was first observed at a military parade. In that year also, construction began for operational Hen House radar installations at Olenegorsk on the Kola peninsula and at Skrunda in Lithuania. These installations, positioned to observe the corridors through which ICBMs from the United States and SLBMs from the North Atlantic would approach the Moscow area, were far enough uprange to avoid self-induced blackout from the interceptors based around the city.

In addition, a number of installations associated with a separate system appeared in the Leningrad area These complexes involved 2 to 5 separate sites with 5 or 6 launchers and a modest sized radar at each site. They originally appeared in 1962 as modifications to sites associated with the GRIFFON missile, an abandoned program for which the Soviets had claimed both air defense and missile defense capabilities. By 1963 new sites were being constructed around Cherepovets, Liepaja, and Tallinn in the northwest, and by late 1965 it became apparent that the system was being deployed both along the frontiers and as a protection of specific points previously covered by the SA-2 air defense missile—a

*Later referred to by DIA as TRY ADP.

pattern which, it was estimated, if extended would ultimately lead to 125 to 175 complexes. Given the size of its radar, its association with the SA-2, and details of its positioning, it seemed probable that the Tallinn system was designed against aircraft flying at medium to high altitudes--that it was an area and terminal bomber defense system perhaps integrated into the ABM system as the damage limiting studies had recommended for the United States But the United States had switched to low-altitude penetration tactics and posed no bomber threat to the Soviet Union at medium and high altitudes. This made the technical interpretation and the large scale of the deployment seem so dramatically out of proportion that many observers in the United States concluded the Tallinn system must have a capability against ballistic missiles as well.

Even granting these assumptions, the Moscow system was not flawless. A number of corridors through which POLARIS might attack Moscow were not covered by either Hen House or Dog House radars, and given their size and most plausible technical characteristics it was extremely unlikely that the Triad radars could handle this threat alone. The Hen House radars were vulnerable to attack from all U.S. systems, and though Dog House was somewhat protected from MINUTEMAN, it was not protected from POLARIS. Moreover, if the lethal radius of the GALOSH warhead were reduced to 10 n.m., the kill probabilities against the Mark 11/11A would be reduced to P=0.2 in the Moscow area. Nonetheless, U.S. analysts following the Soviet program thought the system appeared to be good enough to make mandatory the deployment of advanced penetration aids and the hardening of U.S. warheads against x-rays.

The analysis of the Tallinn system depended entirely on discretionary assumptions, and it was difficult to derive a plausible consistent set which indicated a serious missile defense capability. U.S. intelligence did not have trajectory tracks, [redacted] or other source data on the interceptor--the SA-5. Analysts presumed that it had been developed at Sary Shagan and that it had been used in the intercept tests, but they had not positively identified the development program there. They attributed a [redacted] warhead of [redacted] to the SA-5, not on the basis of any direct evidence but simply on the grounds that the Soviets had tested such warheads. Except for one ambiguous occasion, there existed no Elint data from the system's ground radar--code named "Square Pair"--and pictures of it were insufficient even to determine the mechanism for propagation of the beam. It was obvious from its size,

though, that any serious missile defense capability would require target acquisition and tracking data from the Hen House and Dog House radar; and, while the necessary communications links were imaginable (though not observed), it was considered unlikely that the BESM6 computer available to the Soviets could handle the load of information processing for both the Moscow and the Tallinn systems. The guidance system for the SA-5 was not known, but the best technical guess was a semi-active homing type which would not confer the exo-atmospheric capability required to attack U.S. ballistic warheads. Despite these puzzles the presumption of an ABM capability prevailed, and within the leeway which ambiguity allowed, [redacted] attributed a limited missile defense capability to the Tallinn system operating against the POLARIS Mark 2 warhead. [redacted] also suggested that if the system carried a 1.2 MT warhead it would be a significant threat against the MINUTEMAN Mark 11 and 11A. The majority of the intelligence community discounted this estimate [redacted]

Beyond that, the pace and scale of the SS-11 program made it apparent by 1966 that there would be substantial increases in the Soviet offensive forces. Because the yield and accuracy of the SS-11 were well documented and obviously not sufficient to threaten hardened and dispersed MINUTEMAN installations, this did not become compelling evidence of a full-scale Soviet damage limiting effort as very probably would have occurred had the yield/accuracy combination been more impressive or had more ambiguity been present. Nonetheless, the intensified offensive activity added to the impact which the Soviet ABM activity had on the U.S. Government.

To read Soviet intentions was, of course, far more difficult than to estimate actual technical capability; pertinent, direct evidence ranged from thin to nonexistent. With very little help from formal intelligence sources, American decision-makers were left to their own judgements. Both in public and in the classified record McNamara was circumspect on this question, but according to Assistant to the Secretary Henry Glass, some of his closest aides believed that Soviet doctrinal and organizational commitment to defense would carry forward, that a very large and perhaps preponderant part of the Soviet strategic effort would be devoted to missile defense, and that a large-scale, national Soviet ABM deployment was in its initial stages.*

By the time the planning cycle for the FY 1968 budget commanded McNamara's attention in 1966--a budget which everyone recognized would obtain over the first half of a Presidential election year--the question of ABM deployment had all but moved beyond his control. The JCS had recommended deployment of an area system plus a 25-city terminal defense. For the first time since 1959, Congress had appropriated funds for ABM production.

*One place where these judgments appear to have been recorded was in a document titled "Intelligence Assumptions for Planning," first drafted in July 1964 and revised in June 1965. Prepared (rather reluctantly) at the CIA at the insistence of OSD officials, it eventually evolved into the National Intelligence Projections for Planning (NIPP) series. The June 1965 revision addressed the question of what a large Soviet ABM deployment would look like if it were to be undertaken. The projection envisaged a Soviet defense of 30 urban areas containing 135 cities, 25% of the population, and 50% of industry. Assuming the Soviets would design against an attack of upward of 4,000 warheads and that they would attempt to achieve an overall kill probability of .75, the analysts projected a deployment of 9,000 launchers.

Moreover, the Chinese Communists had tested a nuclear-armed IRBM. The system contractors were arguing that further development without the experience of deployment would not be fruitful. DDR&E had swung in favor of deploying the area interceptor as an initial step, and the Office of the Assistant Secretary for Systems Analysis, though loyal to the Secretary, harbored sentiment in that direction. In the technical community, only the President's Scientific Advisory Committee was solidly opposed.

Above all, President Johnson, beginning to be enmeshed in the frustrations of Vietnam and not yet understanding the nature of the domestic political reaction, worried much about what he called "the right wing." Johnson vividly remembered the days of the missile gap, and he did not relish the thought of an ABM gap plaguing his reelection campaign.[53] McNamara had become isolated on the missile defense question and was under severe pressure.

In appealing to the President in January 1967*, McNamara rested his argument on the anticipated Soviet reaction to an American missile defense deployment.[54] He projected that in the normal course of events the Soviet offensive forces by mid-1976 would have 249-276 SS-9s, 500-950 SS-11s, and 307-399 SLBMs. The Soviet missile defense, he estimated, would contain 800-3,250 area interceptors and 0-1,500 terminal interceptors (his reading of the SA-5). Against this force, he conceded, a balanced U.S. damage limiting program would have considerable utility; as summarized in Table 2 (p.566), a heavy defensive deployment might save 90 million lives against a Soviet first strike. The Soviets, however, could easily offset the indicated gain

*This important memorandum went through several drafts and was rewritten in Secretary McNamara's ofice because the Office of the Assistant Secretary for Systems Analysis and the Director of Defense Research and Engineering could not agree on a draft.

(Table 2) either by expanding the SS-9/SS-11 force or by deploying a new large ICBM with or without independently targeted warheads; and they could drive expected U.S. fatalities up to a minimum of 90 million while enjoying a relative cost advantage. Under such circumstances, McNamara concluded that an ABM deployment against the Soviets would be futile. As he stated in the critical passage of his memorandum to the President:

> It is the virtual certainty that the Soviets will act to maintain their deterrent which casts such grave doubts on the advisability of our deploying the NIKE-X system for the protection of our cities. In all probability, all we would accomplish would be to increase greatly both their defense expenditures and ours without any gain in real security to either side. /Emphasis in the original/[55]

Against the Chinese, McNamara argued, the United States did not need anything as extensive as the NIKE-X system, nor did the U.S. need any deployment at all at that time. The Chinese were not yet deploying an ICBM, and the lead time for a threatening Chinese force would be greater than that required to deploy a United States defense against it.[56]

The recommendation which McNamara carried to the President flowed very naturally from the logic of his argument, but politically it was bold to the point of desperation. He urged the President to authorize him and the Secretary of State "to initiate negotiations with the Soviet Union designed, through formal or informal agreement, to limit the deployment of anti-ballistic missile systems." He urged further that the development of NIKE-X be "pursued with undiminished vigor," but that the decision on deployment of the system be delayed until the outcome of diplomatic initiatives.[57*]

*McNamara also recommended that $375 million be included in the FY 1968 budget "to provide for such actions as may be required at that time--for example, the production of NIKE-X for the defense of offensive weapons systems." This quietly introduced a theme that became important under the Nixon administration and was for McNamara a second tier of resistance to the ABM system in a damage limiting context. The technical reality was, however, that the NIKE-X system had been designed for population defense, that a system designed for defense of the offensive forces would look very different, and that such a design did not exist.

TABLE 2

OSD Analysis of Expected Results of War as Affected By a Balanced U.S. ABM Deployment and Soviet Reactions—as of January 1967

U.S. Damage Limiting Package Against a Constant Soviet Program

(Millions)

	USSR 1st Strike		US 1st Strike	
	US Dead	USSR Dead	US Dead	USSR Dead
1) US Force Already Programmed	120	120+	100	70
2) Posture A - Area Defense of CONUS plus point defense of 25 U.S. Cities	40	120+	30	70
3) Posture B - Area Defense of CONUS plus point defense of 50 U.S. Cities	30	120+	20	70

U.S. Damage Limiting Package Against Soviet Forces Augmented to the Point of Equal Marginal Cost of Offset

(Millions)

	USSR 1st Strike		US. 1st Strike	
	US Dead	USSR Dead	US. Dead	USSR. Dead
1) US. Force Already Programmed	120	120+	100	70
2) Posture A - Area Defense of CONUS plus point defense of 25 U.S. Cities	120	120+	90	70
3) Posture B - Area Defense of CONUS plus point defense of 50 U.S. Cities	120	120+	90	70

Source: Memorandum for the President, 17 January 1967, pp. 19-20.

Some high level diplomatic contacts with the Soviet leaders had raised the possibility of limits on offensive missile deployments and a ban of ABM deployment altogether, but the Soviet leaders had not given any encouragement beyond a general expression of interest. They had indicated rather clearly that the question would give them grave political difficulties. Nonetheless, McNamara was no doubt bolstered by a conviction that the logic of the situation must have impressed itself upon the Soviet leaders.

It is difficult to know in detail what transpired between Johnson and McNamara as the question of NIKE-X deployment came to a head in the early weeks of 1967; the high politics of the problem cannot be found in the archival record, and human memories are fallible. It appears, though, that McNamara was attempting to persuade the President to adopt a posture of forbearance, negotiation, and limited agreement with the Soviet Union which he could carry, if necessary, into the election campaign in 1968. To the Soviets, the withholding of the deployment decision under political pressure would be a symbol of good faith, and McNamara probably assumed--or hoped--that the Soviets would understand the strong tendencies for expansion of the American forces against which he had waged such a long struggle. The case to be made to the American public was the futility of additional strategic deployments and the need for some form of mutual security agreement to prevent them. McNamara rather clearly understood this to require a major, difficult, and transcendently important exercise in public education, and the impending election campaign must have seemed to him an opportunity to try to accomplish it.

For the President such an appeal would be very strong medicine indeed. Johnson would have expected such a strategic policy to be a debit to his political standing, not an asset, and he had debits enough already. Even though he appears to have been flexible enough to imagine reaching a fundamental compromise with the Soviets on nuclear weapons while engaging in the battle by proxy in Indochina he could not see himself standing before the American electorate in such a posture. There were far too many openings for domestic opponents, far too many opportunities for subtle doublecross by the Soviets, to allow an inherently suspicious politician to rally to such a grand cause with unhedged commitment.

In the event, Johnson did act to limit his liability, and in so doing he dramatically increased McNamara's. He authorized the approach to the Soviet Union as requested, but he imposed a 6-month deadline.[58] If the Soviets did not respond affirmatively by mid-1967, the President decided, then NIKE-X deployment would proceed.* This doomed McNamara's position, since it was almost impossible that either government could be prepared for an agreement of such inherent complexity in such a short period of time. The possibility that the Soviet leaders would reach an acceptable summary agreement in 6 months with details to be negotiated later was a gamble against very long odds.

The direct discussion with the Soviet leadership took place in a setting which reflected how long the odds actually were. The occasion was

*In his message to Congress submitting the FY 1968 budget, Johnson adopted the recommendations from McNamara's memorandum entirely, including the phrase suggesting a possible deployment to protect MINUTEMAN installations. See Annual Budget Message to the Congress, Fiscal Year 1968, 24 January 1967 in Public Papers of the President of the United States, 1967: I, 48.

the summit conference of 23-25 June 1967 precariously arranged at Glassboro, N.J., as an excursion from Soviet Premier Kosygin's visit to the United Nations. President Johnson and McNamara raised the topic while sitting next to Kosygin at lunch amidst the background distractions (and potential overhearing) of waiters serving the meal.[59] Kosygin did not accept McNamara's argument, and later in London he puzzled in public as to why anyone could be against weapons designed to defend populations and capable of doing only that. Though there are hints that more discreet channels from Moscow were less discouraging, Johnson's deadline ran out with no serious prospect for an agreement of any form.

Shortly after the Glassboro conference, Johnson decided to proceed with an ABM deployment; but reflecting his primary concern with his political posture, that was all he decided. He delegated the details of the deployment to McNamara, and that left scope for some further resistance to the full implications of the decision. Throughout the summer of 1967 McNamara directed intensive staff work designed to structure the deployment in such a way as to minimize the possibility that it would lead to an extensive damage limiting effort. As a logical matter, that purpose would best be accomplished by deploying the system to defend ICBM installations rather than cities since such a deployment could be exclusively related to assured destruction. A technical design for such a system simply did not exist, however, and OSD analysts could not produce it.* As a substitute,

*The Office of the Assistant Secretary for Systems Analysis did discuss the application of SPRINT missiles and their missile site radar to a defense of MINUTEMAN bases. This interceptor/radar combination had not been designed for this purpose, however, and was far too expensive to be usefully applied. The altitude of intercept, for example, which had been chosen to protect vulnerable cities was too high for economic protection of hardened missile silos. In general, the missile site defense problem was sufficiently different to require an entirely new design effort beginning with the major components--the interceptor and the radar.

they developed the argument that a system of SPARTAN area interceptors, with SPRINT applied to defend the critical radar installations, would provide sufficient protection against the anticipated Chinese threat to restore whatever political leverage might be lost as a result of China's strategic program. The logic was that by denying the Chinese the ability to attack or retaliate against the United States, the U.S. strategic deterrent would include protection of the interests of Asian allies.[60] Given the very active support of the North Vietnamese by the Chinese even in the absence of a nuclear threat against the United States, the argument was hardly a powerful justification for an ABM deployment, but it did offer a restricted rationale which could not be readily accommodated to a larger deployment against the Soviet Union.

McNamara announced the limited (12 sites) missile defense deployment labeled the SENTINEL system in a widely noted speech to editors and publishers of United Press International on 18 September 1967. The major portion of the speech rehearsed his arguments against missile defense in general, and the limited deployment with its special rationale was revealed as a deliberately paradoxical conclusion. To those who could read behind the text, it was obvious that McNamara had complied minimally with a distasteful political directive and that he considered the decision to be a significant defeat for his policy.[61]

Quantity and Quality of the Offensive Missile Forces

As the 5-year force projections were set forth in the fall of 1961, initiating the evolution of deliberate constraints on the strategic forces, it was already apparent that major qualitative improvements were impending

in the ballistic missile programs* and that the technical upgrading of force components would have contrary effects on overall force size restrictions. The impending improvements were driven not only by the appeal of successful technology, but even more by recognition that major technical deficiencies in the early programs had to be overcome if the United States was to maintain ballistic missiles as a prime element of its deterrent forces. McNamara supported and encouraged qualitative improvement because he wanted to remove obviously debilitating deficiencies and use such improvements as leverage for imposing constraints on force size. Although he succeeded in the latter intent, he subverted his larger purpose, for the qualitative improvements he promoted had fully as dramatic an effect on offensive capability as would have the increases in force size he was resisting.

An obvious need in 1961 for qualitative improvements derived from the consequences of accelerating the missile programs in reaction to Sputnik. In the post-Sputnik period, the managers of the major missile programs--particularly the special offices developing MINUTEMAN and POLARIS--understood themselves to be in a race to achieve operational capability before the Soviets could do so with comparable systems. They accepted, therefore, major design compromises in order to advance the deployment date of operational systems. The POLARIS A-1 went into production with a range of only 1,200 n. miles, 300 n. miles less than the design target, and the A-2 provided only 1,500 n. miles. With development and production running concurrently under an accelerated production schedule, the first 18

*For earlier developments in the missile programs, see above Chapters V and IX.

submarines were equipped with 1 of these 2 models, and that required a retrofit program when the 2,500 n. mile A-3 was finally developed. Similarly, the first model of MINUTEMAN I—the LGM-30A—had a range of 4,900 n. miles [redacted] as compared with 1958 design specifications of 5,500 n. mile range, [redacted] The 150 original LGM-30-As produced[62] for Wing I of the MINUTEMAN force required early replacement.

Qualitative improvements in the deployed forces were more powerfully stimulated by the vulnerability factor. The necessity of having minimally vulnerable deterrent forces, the strongest argument of the strategic analysis, assumed great importance in the attempt to control strategic operations. This worked against the early ATLAS and TITAN programs, both of which were highly vulnerable to attack. The ATLAS Ds and Es and the TITAN I programs all utilized cyrogenic propellants (RP-1 and liquid oxygen) which required that the fuel be held at very low temperatures and loaded into the missile just prior to launching. This cumbersome process required at least 15 minutes; given tactical warning times it might be a dangerously slow reaction time. ATLAS D had no protection during this process and ATLAS E very little (25 psi). TITAN I remained in its 150-200 psi silo during the fueling operation but had to be raised to the

*The MINUTEMAN I and POLARIS A-1 had even more severe defects which were not appreciated until much later. The internal wiring of both missiles rendered them vulnerable to electromagnetic pulse effects at ranges in excess of 1,000 miles. There was a defect in the POLARIS warhead which degraded its reliability very seriously under operational use. These defects when discovered required major retrofit programs, but there is no evidence that they resulted from the furious rush for operational deployment. They probably would have occurred even if the missile deployments had been under a more leisurely schedule.

surface for firing. Beyond that, ATLAS D and TITAN I had radio inertial guidance systems and thus depended on a vulnerable data link. ATLAS F which had all-inertial guidance and a capacity for prolonged fuel storage and which was deployed in a 150-200 psi silo had solved some of these problems. Since it still utilized the same cyrogenic fuel, however, it required such elaborate support that the missile was expensive to maintain on alert--about $1 million per missile per year as opposed to about $100,000 for MINUTEMAN. The firmly established principle that deterrent forces must be invulnerable dictated early retirement of all of these systems--a total of 177 operational missiles.*[63]

Technical upgrading of the first generation missile force to remove the early deficiencies and to reduce vulnerability was already included in President Kennedy's special budget message on defense in March 1961, and thereafter it was a continuing and largely uncontroversial process with at least three distinguishable stages. First, advanced models of the original MINUTEMAN, POLARIS, and TITAN were programmed as soon as possible into slots already authorized for the early models. Second, the vulnerable and expensive systems using cyrogenic fuel--all models of ATLAS and TITAN I--were rapidly removed from service as soon as the operational inventories of MINUTEMAN and POLARIS reached significant numbers. Third, as evolutionary development of the original design stabilized in the MINUTEMAN II (LGM-30-F) and the POLARIS A-3 and as the authorized strategic deployment program was completed, production of the advanced models continued and the early models were gradually replaced. Details

*The peak operational deployments were as follows: ATLAS D, 24; ATLAS E, 27, Atlas F, 72; TITAN I, 54.

of this process are presented in Table 3/ (p.575), which summarizes the major technical improvements made through the sequence of model changes, and in Table 4/ (p.576) which traces the first generation* model changes in the operational forces.[64]

This process of technical adjustment of the first generation deployment, though it brought significant improvements in offensive capability, was not a major issue of high-level policy. The improvements in the operational forces all helped serve policy aspirations which were present and reasonably well formulated in the original strategic force programming. As compared with the original models, the MINUTEMAN II, the Polaris A-3, and the TITAN II provided greater ability to sustain alert operations under attack, greater flexibility to respond to the command channels, accuracy improvements useful in attacking a large number of interesting (but soft) military targets on second strike, and somewhat lessened vulnerability to missile defense. Though these changes served to establish the process

*The notion of a technical generation of missiles is loose and troublesome. Four generations are usually identified in the Soviet program--respectively the SS-6; the SS-7 and 8; the SS-9, 10, 11, 13; and the SS-16, 17, 18, 19. The differences among the first three, however, are not as great as between the successive models of what is here identified as the first generation of American programs. Nor were the early models of the fourth Soviet generation as advanced as the MINUTEMAN III (LGM-30G) and the POSEIDON (C-3). Rather than attempt to impose a consistent but arbitrarily imposed definition, it seems better to let the meaning of the concept change to reflect what we know about the separate programs of the two countries. We count the LGM-30-A to F; the POLARIS A-1 to A-3, and even TITAN I and TITAN II as first generation to reflect the fact that the same basic designs were undergoing evolutionary development. By contrast, we acknowledge that four generations have been distinguished in the Soviet program because it has been important for intelligence purposes to emphasize technical distinctions.

Table 4

U.S. Strategic Missile Launcher Inventory by Technical Model and Year
As of 30 June

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
ATLAS													
D	5	27	27	18	-	-	-	-	-	-	-	-	-
E	-	1	27	27	27	-	-	-	-	-	-	-	-
F	-	-	3	72	68	-	-	-	-	-	-	-	-
Subtotal	5	28	57	126	113	-	-	-	-	-	-	-	-
TITAN I	-	-	21	54	54	-	-	-	-	-	-	-	-
II	-	-	-	13	54	54	54	54	54	54	54	54	54
Subtotal	-	-	21	67	108	54	54	54	54	54	54	54	54
MINUTEMAN													
I	-	-	-	160	600	800	800	660	570	500	440	340	240
II	-	-	-	-	-	-	80	300	394	494	494	494	494
III	-	-	-	-	-	-	-	-	-	-	10	110	210
In Modification	-	-	-	-	-	-	-	40	36	6	56	56	56
Subtotal	-	-	-	160	600	800	880	1,000	1,000	1,000	1,000	1,000	1,000
POLARIS													
A 1	-	64	80	80	80	80	64	16	-	-	-	-	-
A 2	-	-	16	64	176	208	208	208	208	128	128	128	128
A 3	-	-	-	-	-	176	256	400	448	528	528	480	368
Subtotal	-	64	96	144	256	464	528	624	656	656	656	608	496
POSEIDON													
C 3	-	-	-	-	-	-	-	-	-	-	-	48	160
Grand Total	5	92	174	497	1077	1318	1462	1678	1710	1710	1710	1710	1710

Sources:
OASD Comptroller, 1 Jun 78;
U.S. Navy, SP-12, 31 Mar 80

of "force modernization" as routine business, they did not themselves contradict the policy of constraint. In fact, since the ATLAS and TITAN I deployments were not replaced, the process reduced force levels slightly.

Still a third stimulus to qualitative changes in the offensive missile forces carried far more serious implications. As previously noted, the analysis of NIKE-ZEUS made it clear that even in 1961 first generation reentry vehicles of the American force would be vulnerable to missile defense systems. A PSAC analysis in 1961 suggested that given Soviet missile defense activity, penetration by then-current U.S. RV designs could not be sufficiently assured for the period 1963-66.[65] Studies of a number of principles for reducing vulnerability to missile defense were already underway, notably the use of multiple warheads and reduced radar cross-sections. This combination ultimately led to a new technical generation and seriously undermined the policy of restraint.[66]

As weapon designers began to face the problem of ABM penetration in 1962 it became apparent that warheads would have to be well separated from the third-stage rocket booster (which could be readily observed on radar) and that decoys used to saturate and confuse a defense system would have to be placed on trajectories also well separated from each other and from real RVs . These considerations led a number of weapon designers* in 1962 and 1963 to develop design concepts of a post-boost propulsion and guidance

*Ted Greenwood, who traces the development of MIRV technology in detail in his book Making The MIRV: A Study of Defense Decision Making (Cambridge: Ballinger, 1975), identifies five apparently independent inventors of a maneuvering post-boost control system capable of delivering multiple RVs to separate targets (pp. 27ff.). Four of the five he mentions had some variant of the ABM problem in mind in working out their technical conceptions.

platform to put multiple RVs and/or decoys on separated, deliberately selected trajectories. As these design concepts evolved and were related to enlarged booster designs which would provide greater payload, it became apparent that the resulting systems(labeled MIRV for multiple, independently targetable reentry vehicles) would not only provide a means of overcoming missile defense but would also permit very efficient increases in target coverage. If a booster with a maneuvering post-boost platform was going to be necessary to attack even a single target, then multiple warheads capable of separate, predefined trajectories would allow additional targets to be attacked at very low marginal cost. Substituting live warheads for decoys would hedge against improvements in target discrimination by the opponent's defense while extending offensive target coverage.[67]

For these reasons, the MIRV concept appeared compelling to the weapon designers and systems analysts, but it was far less so to the two Services immediately involved--the Air Force and the Navy. The Air Force, deeply engaged in its argument for a larger strategic program, was primarily concerned with modernization of the bomber force and secondarily with expansion of the authorized missile deployment. It recognized that MIRV would compete with both objectives. Moreover, the multiple warhead concept ran against a strong preference in the Air Force for large yield weapons,*

*Obviously for a given payload volume and weight, division into a number of separate warhead packages would mean lower yields for these packages than could be achieved if the entire payload was devoted to a single warhead. The Air Force had a development program--the Mark 12--to replace the Mark 11 RV of the early MINUTEMAN models, and by 1963 two versions had been defined. The Mark 12 heavy was projected as a single warhead [redacted] the Mark 12 light was envisaged as a MIRV with 3 warheads [redacted] (Greenwood, pp. 4-5.)

a preference deeply rooted in its operational experience. In World War II the effectiveness of strategic bombardment had been seriously degraded by two related factors: First, the essential elements of industrial targets were more resistant to damage than had been supposed, and second, accuracies of delivery under combat conditions were far less than those calculated on the basis of training exercises. The enormous energy of nuclear explosions in the megaton range of yields covered both of these dimensions, and the Air Force, more sensitive than others to the difficulties of operating modern weapons under the pressure of combat, was intent on securing this advantage.*[68]

For its part the Navy resisted MIRV because it entailed diverting yet more resources to the POLARIS program and away from the surface fleet. This was deeply felt and constituted a serious barrier, but there was no resistance beyond that. Because of their virtually exclusive focus on the assured destruction mission, Navy strategic planners were not as concerned as the Air Force with high accuracy/yield combinations and were amenable to the MIRV concept itself.** When by 1965 the Livermore Laboratory

*By 1972 the circular error probable (CEP) was well established as the standard measure of accuracy. By definition, value of this parameter gives the radius of a circle around the aiming point within which a bomb or warhead is expected to fall with probability, p = .5. This concept presupposes that errors are randomly determined and fit a normal distribution. Data from combat experience with aircraft, however, tend to be bi-modal with one mode tightly clustered around the target and a second rather widely dispersed--suggesting the presence of some systematic set of determinants. There were no comparable data for missile systems, but missile test data did suggest that some biased sources of accuracy errors were operating. Thus, the Air Force was reluctant to accept the implication of the standard formula for probability of damage against a given target - that accuracy is more important than yield.

**40KT with a .5 n. mile CEP was completely adequate for imposing general damage on cities, all the basic retaliatory threat or its actual execution required. The Air Force concern with accuracy and yield derived from its commitment to achieve direct effects on military capability and thus the destruction of hard targets such as enemy missile installations and heavy industrial machinery.

had developed a very small weapon design in the [redacted] range, the Navy adopted that warhead with a small reentry vehicle (labeled the Mark 3) in its developing plans for the POSEIDON missile. It appeared to be the best available hedge against ABM defenses* and had the additional benefit of being separate and distinguishable from the Air Force program.[69]

The qualitative upgrading of the strategic forces came into clearest focus in the fall of 1964 when preparation of the FY 1966 budget created the occasion for relating this process to the basic question of force size. There were a number of strands to the problem. First, as already discussed, the Soviet ABM program seemed to compel some adjustments to reduce the apparent vulnerability of the U.S. offensive warheads. Second, by summer of 1964 the major development program for an advanced RV--the Air Force Mark 12 program--had experienced such delay that it could no longer be programmed as the warhead for the MINUTEMAN II; the initially deployed models of MINUTEMAN II therefore would have to carry the theoretically vulnerable Mark 11 and 11A. Under impetus from DDR&E, the Mark 12 program was reoriented; it was mated with an enlarged version of MINUTEMAN (ultimately the LGM-30G or MINUTEMAN III) which would allow full realization of the 3-warhead MIRV originally projected as the Mark 12 light.** The [redacted]

*The small warhead was recommended by the PEN-X study, conducted by the Institute for Defense Analyses in August 1965, as the highest confidence means of defeating terminal defenses.

**The official marriage between the Mark 12 and the MINUTEMAN booster with an enlarged third stage did not actually occur until March 1966, when the MINUTEMAN III was authorized for development (Greenwood, op. cit., p. 8). The design was nonetheless known in the technical community at the time that the Mark 12 program was reoriented, and it provided a realistic basis for the MIRV concept--i.e., it was recognized that if the Mark 12 could not be made light enough and small enough in volume, an adjustment to the booster was available.

originally the Mark 12 heavy, was redefined as the Mark 17, available for retrofitting on the MINUTEMAN II and offering a serious hard target capability. It would also fit on the enlarged POLARIS--the B-3. This provided the technical basis for MIRV deployment as a hedge against Soviet ABM systems.[70] Finally, the FY 1966 budget review was the last opportunity to cut off further increases in the MINUTEMAN force. Up to fiscal year 1965, the 5-year defense plan--which was presented to Congress but not officially enacted by it- [redacted] Since actual funding of these increases would have to begin in fiscal year 1966, their formal authorization would have to be included in the FY 1966 budget.[71]

For McNamara, up against a major budget deadline for his policy of restraint and under considerable pressure from the emerging Soviet program,* the availability of MIRV to extend offensive force coverage and to hedge against missile defense without adding to the number of programmed missile launchers offered a major opportunity. In his review of the FY 1966 budget in December 1964 he eliminated procurement funds for MINUTEMAN missiles approved by OSD, and he imposed the now familiar ceiling of 1,000** for all five years of the force plan, thus stabilizing the

*By the fall of 1964 various intelligence sources had begun to pick up signs of the accelerated deployment of Soviet offensive systems.

**McNamara had clearly contemplated a ceiling of 1,000 on the MINUTEMAN force during the preparation of the FY 1965 budget undertaken in the fall of 1963. The assassination of President Kennedy so disrupted the budget process that he apparently decided to back off, though the FY 1966 strategic force DPM documents indicate that he proposed leveling off the MINUTEMAN force at 1,000 during the spring of 1964. The significance of this earlier timing is that it might have allowed him to keep the issue out of the budget process entirely, thus not even running the risk of having the previously planned increases included in the Service budget submissions.

MINUTEMAN deployment 100 missiles below his projection in the FY 1963 defense plan. (Table 5, p. 583 gives the successive 5-year plans as requested by the Air Force and as approved by McNamara). He provided funding for the redefined Mark 12* and Mark 17 RV development programs as well as for a POLARIS B-3 (later enlarged to the POSEIDON C-3), and he included a specific analysis to demonstrate that an "improved capable missile" carrying multiple RVs (7 of them in the analysis would be the cheapest means of destroying targets 100 psi or harder. On these latter grounds, he rejected the Air Force request for a development program for the AMSA advanced bomber but agreed to continue design studies and some propulsion and avionics development work.[72]

The central feature of the FY 1966 strategic budget, which in the Draft Presidential Memorandum, in the President's budget message, and in McNamara's congressional testimony provided the primary justification for the ceiling of 1,000 on the MINUTEMAN, was the retrofit program. At its then-projected completion in fiscal year 1970, the retrofit program would replace 550 MINUTEMAN I missiles with MINUTEMAN II, leaving a force mix of 250 MINUTEMAN Is and 750 MINUTEMAN IIs. The underlying logic was that the Soviet ICBM deployment would ultimately reach about 700**--enough less than the U.S. program, it was thought (by extension to them of our own damage limiting analysis)--to enable the Soviets to avoid stimulating

*The redefinition entailed specifying the program as a true MIRV capable of attacking several targets rather than simply as a package intended to assure ABM penetration. The technical significance is that the area over which the multiple warheads could be dispersed (the "footprint") was enlarged. (DPM, fiscal year 1966, prepared December 1964).

**This precise a figure was usually not recorded in official estimates. Henry Glass, who summarized the intelligence estimates for the Secretary as part of the posture statement, recalls 700 as the figure used by the Secretary and his key advisors. The NIE in 1964 showed 410-700 and in 1965, 500-800.

TABLE 5

The Five-Year Force Plan For MINUTEMAN as Requested by the Secretary of the Air Force (R) and as Approved by the Secretary of Defense (A), 1963-66

	FY 63	FY 64	FY 65	FY 66	FY 67	FY 68	FY 69	FY 70
R63	150	600	1250	2000	2,600			
A63	150	600	800	950	1,100			
R64	150	600	900	1,200	1,650	1,950		
A64	150	600	800	950	1,150	1,300		
R65	150	600	800	950	1,250	1,400	1,400	
A65	160	600	800	950	1,000	1,100	1,200	
R66	160	600	800	950	1,000	1,100	1,200	1,200
A66	160	600	800	880	1,000	1,000	1,000	1,000

Source: (S) Draft of Minutes of Testimony of Secretary of Defense McNamara before House Appropriations Defense Subcommittee, 4 Mar 65, p. 2465.

further increases in the U.S. forces.[73] If this transpired, then 700 Mark 17 RVs could be retrofitted into the force to approximate the 1 missile per hard target deployment which had just been recommended in the document summarizing the damage limiting studies. The remaining 300 missiles could then be retrofitted with the Mark 12 to provide further protection of the assured destruction mission through ABM penetration. The POLARIS B-3 missile provided a reserve force which could be used for ABM penetration with the Mark 12 or additional hard target coverage with the Mark 17.[74]

This logic was further implemented in the FY 1967 budget, which provided enlarged boosters to carry the MIRV warheads--the LGM-30G (MINUTEMAN III) to carry the Mark 12, and the POSEIDON C-3 to carry many more of the smaller [redacted] Mark 3. The retrofit program was again amended to replace the last MINUTEMAN I installations with the new MINUTEMAN III and to retrofit an indefinite number of POSEIDON missiles into POLARIS submarines. This in effect was the deployment decision for the MIRV systems.[75]

These decisions in the FY 1966 and FY 1967 budget cycles climaxed the policy of restraint and constituted another adroit finesse by McNamara. He used the programming of qualitative improvements, so widely supported as to be virtually inevitable, to establish finally the ceiling on overall force size. In doing so, he forced the Mark 12 onto a technical track against the strong preferences of the Air Force. The Mark 17, [redacted] that much more nearly fit the Air Force design preference, was largely at the conceptual stage and was cancelled in 1968 after successful development of the Mark 12 and with the Navy's much smaller Mark 3 in the background as a potent competitor. As the Soviet SS-11 deployment began to emerge in 1967 and 1968 on a scale well exceeding both private expectations and official

intelligence projections, compensations were made by extending the retrofit of POSEIDON to the maximum (31 submarines)*, by increasing the mix of MINUTEMAN III/Mark 12 to 550, and by upgrading the hardness of all MINUTEMAN sites. The Air Force, perhaps aided by the retirement of Gen. Curtis LeMay in 1965, accommodated to this sequence, recognizing that McNamara had succeeded in his extended effort to impose a firm ceiling on the U.S. offensive forces.[76]

McNamara's victory quickly turned out to be shallow. The MIRV systems which he used to impose the force ceilings yielded improvements in nominal values for missile accuracy which, when inserted into well established calculations of kill probability, gave the appearance of a significant damage limiting capability. The standard formula widely used to calculate the probability that an attacking missile would destroy a land-based missile installation is:

$$P = 1 - \exp - \left[C \frac{NY^{2/3} [F(Y)]}{(CEP)^2 H^2} \right]$$

where N = the number of independently targeted warheads; Y = the yield of each warhead; F (Y) is a function expressing the sensitivity of the attacking missile to overpressure pulse duration; CEP is circular error probable; H is hardness of the target; and C is a constant determined by the units in use.[77] From this equation it appears that increased numbers of warheads, and particularly increased accuracy, can substitute for yield in determining destructiveness against hard targets. By the late 1960s the accuracies being projected for spin stabilized warheads with high

*The other 10 Polaris submarines did not lend themselves to retrofit.

beta numbers* promised sufficient accuracy (on the order of 0.2 n. miles and better) to render hardened land-based installations vulnerable to attack by MIRV warheads. It was by no means clear that this result was a valid one, but the basic equation which yielded it had come into such widespread use** that the appearance of vulnerability was taken seriously, if only because of political consequences that many believed would follow. As early as 1965 an Air Force study had stated that a Soviet force which had a CEP of 0.2 n. m. or better and an overall payload*** above 1,900 kilopounds would force the United States to abandon its MINUTEMAN installations,[78] and the Strategic DPM for fiscal year 1967, prepared in the fall of 1965, conceded that Soviet accuracy of 0.2 n. mi. with MIRVs would threaten the total destruction of the MINUTEMAN force.[79] If these were correct calculations, then by extension of the same logic to the Soviets--a fundamental principle of McNamara's resistance to damage limiting programs--the Soviets should have similar fears and similar incentives to react.

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*The beta number is calculated by the formula $\frac{W}{Cd\ A}$ where W = RV weight, A is a measurement of area, and Cd is the coefficient of drag characteristic of the RV's shape. Beta numbers above 1,000 lbs. per sq. ft. travel through the atmosphere with sufficient speed to remove much of the contribution of the reentry phase to CEP. It is apparent that reducing radar cross-section to aid ABM penetration and increasing the beta number to aid in accuracy are mutually compatible.

**It was the basis, for example, of the popular disk calculation published by the Rand Corporation for making force effectiveness calculations based on yield, CEP, hardness, and warhead numbers.

***Payload (later called throw-weight) became a convenient force measure because a given payload could be allocated in any of a number of ways to achieve an overall value for the term in the kill probability formula:

$$\frac{NY^{2/3}}{(CEP)^2}$$

In short, MIRV technology, used to impose a ceiling on the U.S. forces and thereby to resist the damage limiting mission, quickly became the opposite--namely an efficient mechanism for pursuing damage limiting through offensive counterforce capability, even within the constraints on force size. That which McNamara had so labored to prevent ironically came to pass at his own instigation.

Control of Force Operations

Force Operations as a Separate Problem

As the Kennedy administration assumed office in 1961, the great surge in strategic offensive capability, as measured in terms of technical commitment and programming of basic force components, had largely run its course, but it was still the early dawn of serious operational capability to wage nuclear war. The large American force of bombers and tactical fighters could have wrought enormous damage in the Soviet Union had it received adequate strategic warning (i.e., measured in days rather than minutes) and if it had encountered little resistance before reaching Soviet airspace. Bomber operations, however, were vulnerable to disruption at early stages of preparation; the alert force could be exhausted by a calculated series of spoofs; and above all, channels of command and operational control were vulnerable at every link. Destruction of a dozen sites, it was estimated, would deprive the force of all high level command authority. Beyond that, the rapid development and deployment of the early missiles meant that partially solved or incorrectly solved technical problems resulted in poor operational reliability, casting doubt on the

adequacy of the missile forces to sustain the deterrence mission over an extended period of time. Finally, the first SIOP (SIOP-62) was but a month old and in early stages of evolution. Unofficial opinion among its drafters in JSTPS conceded that it was deficient, and that it did not guarantee the coordination of strategic operations.[80]

The problems of working out effective operational capabilities did not have the strong political reverberations that marked the issues of force size. Pertinent information enjoyed much stricter security protection, and the issues did not present themselves as significant budgetary or legal questions requiring congressional authorization. The press and the concerned public tended largely to assume the existence of real operational capability with the first demonstrations of the underlying technology and were little interested in the details involved in making that assumption a reality. Nonetheless, for the new Administration assuming power and particularly for Secretary McNamara, the state of the operational forces quickly became a compelling concern. McNamara returned from his first official trip to SAC headquarters at Omaha in early February deeply concerned with the apparently tenuous links of command authority and with the entire operational posture, which strained for rapid (indeed preemptive) and massive response to an imminent attack. When he briefed the President on defense problems on 21 February 1961, prior to the submission of the special budget message on defense, McNamara identified the vulnerability of the force and particularly its command channels as the nation's most serious defense problem.[81]

This rapidly developed concern was sharply intensified by the experience of the Berlin crisis through the summer and early fall of 1961. Khrushchev's threat to the status of the city stimulated the creation of an allied task force to work out a response should the Soviets move against West Berlin, a possibility taken very seriously at the time. In the course of these discussions, it became apparent that NATO conventional forces could not force access to Berlin against Soviet resistance.[82] Given the weaknesses in the command channels--including particularly ambiguous procedures for devolution of authority to local commanders--it appeared possible that a battle over Berlin could precipitate a nuclear reaction from NATO forces without authorization from the U.S. Government and even against its wishes.

With the NATO problem most immediately in mind, McNamara established in the late summer of 1961 a special task force under Gen. Earle E. Partridge (USAF, Ret.) to review command and control problems and particularly to render a judgment on the control of nuclear forces.[83] In October, at about the time the Berlin crisis was abating, the Partridge task force reported that because of physical devices (permissive action links, or PALs in the military jargon) being installed in NATO nuclear weapons the possibility of their use without U.S. authorization was remote. Though this was encouraging, the task force also pointed out that this tight negative control meant that positive control (authorization for attack) could not be guaranteed because of the vulnerability of the command channels.[84] The implications of this dilemma were clear: Permissive action links could be imposed on SACEUR as an international commander and a marginal participant in the U.S. strategic offensive plans; but such

secure negative controls could not be imposed on core elements of the U.S. forces--most notably, not on the POLARIS submarines under CINCPAC and CINCLANT.[85] Vulnerability of communication links to POLARIS submarines would allow an opponent to neutralize the submarines if permissive action links were installed.

These problems associated with the operational forces were separate both conceptually and organizationally from the question of force size, and that itself was a major source of difficulty. It meant that McNamara and the two Presidents he served were subjected to severe cross-pressures as they struggled to deal with the highly volatile public politics associated with the issues of force size at the same time as they were attempting to cope with the shadowy and uncertain world of command and control arrangements, where the most important determinants of national safety seemed increasingly to reside.

The conceptual separateness of force operations issues derived from a dilemma in the logic of strategic policy. In the process of imposing a ceiling on the U.S. offensive forces program, the objective of achieving stable deterrence by threat of assured destruction was established as the principal criterion of force size. Had the damage limiting objective been seriously used as a criterion of force size, it would have stimulated much larger forces and, presumably, an offsetting reaction by the Soviets. When applied to the problems of force operations, however, the two doctrines reversed their implications. Strategic forces would operate only if there was a serious failure of deterrence, and once that had occurred it was the assured destruction conception which became expansive and dangerous. An assured destruction attack clearly implied full use of the strategic

forces and full attack against all Soviet targets that could realistically be covered*--i.e., it was the last thing that a reasonable person would wish to do. The hope of preserving constraints, even after a failure of deterrence, rested on second-strike counterforce operations against carefully segregated military targets. Theoretically at least, as long as some major urban-industrial concentrations remained undestroyed after the first rounds of attack, then some continuing deterrent effect should occur and damage might be held below its full potential. In the world of force operations, then, second-strike counterforce was a restraining doctrine, and it had to be preserved for that purpose even as it was being resisted in the context of force size questions.

The issues of force operations involved chiefly the operational commanders and the strategic planning group, JSTPS. The budget process, where McNamara and his systems analysts exercised their greatest leverage, was not a good mechanism for dealing with the major operational questions. Effective authority over the operational forces resided with the unified and specified commanders. Judged by the fraction of the strategic forces under his operational control and by his dominance in the planning process, CINCSAC/DSTP was the most important figure; CINCPAC and CINCLANT were next; and CINCEUR/SACEUR was a distant third. The most critical process was the preparation of the National Strategic Target List (NSTL) and the Single Integrated Operational Plan (SIOP). The JCS and the Secretary of Defense were somewhat removed from that process, exercising more influence over general policy than specific content.

*If the Soviets were to be subjected to an assured destruction attack, then everything feasible should be done as well to reduce the weight of their subsequent retaliation.

Evolution of the SIOP

The first integrated strategic nuclear war plan, SIOP-62, brought into focus some of the grave difficulties involved in trying to conduct coherent military operations under conditions of nuclear combat. As noted previously, SIOP-62's extremely conservative planning factors resulted in plans for extraordinarily heavy bombardment of the Sino-Soviet Bloc target. Very heavy attacks on China, North Korea, and the Eastern European Communist states, as well as the Soviet Union, would occur if a major war developed, for example, from the Berlin crisis.* [redacted] The briefing designed for the President in the event of nuclear crisis emphasized that the forces became increasingly vulnerable as the decision to retaliate was delayed. To the extent, then, that SIOP-62 was a serious plan capable of implementation, it could become under crisis conditions a blueprint for sudden uncontrollable disaster.

*Concern over the Berlin situation was great enough during the summer of 1961 that high Administration officials--notably Carl Kaysen on the White House staff and Henry Rowen, Deputy Assistant Secretary of Defense for International Security Affairs--quietly arranged for the preparation of a more realistic and more limited attack plan which exploited particular weaknesses at that time in the Soviet air defense network. These precluded the need for air defense supression missions. The plan assumed that the United States would initiate the nuclear attack, albeit in response to lesser order provocation.

McNamara and his analysts found the plan unrealistic in critical aspects. Since the generation of U.S. forces to full readiness would be slow and very observable, and since the Soviets apparently intended to preempt against command and control targets on the basis of strategic warning,* it was not likely that full execution of the SIOP would occur with the command system intact. Some opinion within JSTPS held that the course of war would actually be determined by what operational commanders could improvise with whatever forces they could muster at the time.[87] Moreover, as the results of the early satellite reconnaissance missions made apparent, a significant portion of the targets listed in the NSTL were incorrectly located, with errors large enough to make their destruction by the attacks planned in SIOP-62 extremely unlikely.[88] These defects certainly undermined the probable effectiveness of the plan but did not diminish its inherent dangers. SIOP-62 accurately reflected the views of the Strategic Air Command and gave good indication of the kind of attack that the operational commanders would attempt to undertake if events propelled them into nuclear combat. [redacted]

The further evolution of the SIOP began with the first of the aforementioned problems--the heavy attack on each defined target resulting from the conservative planning assumptions. This most concerned the Navy because of its implications for the size of the strategic forces and the

*See below, pp. 663-65,668.

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degree of their commitment to preplanned operations. The Navy's attempt to appeal the rulings of the DSTP, Gen. Thomas S. Power, provided the first impetus for change. In early February 1961, the Secretary of the Navy, John B. Connally, sent a memorandum to McNamara criticizing the damage criterion, the assurance of delivery, and the procedure for calculating radiation effects in SIOP-62. The damage criterion incorporated in the NSTAP, the Navy argued, was excessive. It required a [redacted] probability of severe damage to the targets, and this required extremely heavy attacks. [redacted] At Hiroshima, 25 percent of the population was killed, 25 percent wounded, and 65 percent of the buildings were destroyed by a single 18-kiloton bomb.* [redacted]

Finally, the Navy Secretary noted that radiation at the network of check points was calculated using only the largest single bomb for each DGZ and discounting enemy explosions entirely--an obvious underestimate which distorted the extent to which the radiation constraints would be met under the large programmed attack.[89] All of these criticisms served the Navy's desire to reduce the level of preplanned strategic operations. Going beyond

*Estimates of the yield at Hiroshima vary. Connally used 18 kilotons in his memorandum.

the Connally memo, the Navy also contested the content of the NSTL, on the grounds that it contained targets of primary interest to theater commanders, which, it argued, ought not to be included in preplanned strategic operations.[90]

Under impetus of the Navy argument, a debate developed during the spring of 1961 among the Joint Chiefs of Staff concerning the guidance for the first SIOP revision. The Army Chief of Staff, Gen. George H. Decker, the Commandant of the Marine Corps, Gen. David M. Shoup, and the JCS Chairman, Gen. Lyman L. Lemnitzer, all joined with the Chief of Naval Operations, Adm. Arleigh A. Burke, in arguing for a less demanding criterion of damage and a more restrictive target list. This isolated the Air Force Chief of Staff, Gen. Thomas D. White, who defended the character and underlying assumptions of SIOP-62, but the 4 to 1 JCS majority did not significantly diminish the effective authority over the strategic plan exercised by General Power in his dual role as SAC commander and DSTP.[91] The compromise effected by General Twining and Secretary Gates in 1960 had established the principle that all strategic bombs and warheads would be included in the SIOP; and, with more than [redacted] individual weapons at his disposal by the time the first SIOP revision took effect, General Power was able to sustain the conservative planning assumptions and the expansive target list.[92] The alternatives were to return to decentralized and uncoordinated operations by theater commanders or to put a substantial part of the strategic force into reserve under conditions which, given the vulnerability of the command system, rendered it unlikely that such a reserve could actually be used in any coherent manner.

Beginning with the first revision in 1961, the SIOP was revised on a regular schedule. The sequence of SIOP revisions prepared by the JSTPS and the dates when the various plans were officially in effect down to 1972 is presented in Table 6 (p. 597). Table 7 (pp. 618-24), which summarizes the characteristics of the various SIOP revisions, shows a slight trend over time in the direction of the Navy argument. This followed largely from the expansion of the Soviet target system (caused chiefly by eventual deployment of a large land-based missile force) and reduction in the average yield of individual warheads and bombs in the American force. In recognition of this trend, the NSTAP was revised in 1969 to downgrade the specified damage criterion; with revision E of SIOP-4 (in effect from January to June 1969) and thereafter, the criterion was stated as moderate damage to [redacted] Nonetheless, at the end of June 1972 the scale of the attack planned in the SIOP remained very large indeed.[93]

For the civilian leadership, the scale of attack planned in SIOP-62, though a serious enough matter, was not as significant as its indiscriminate character. Given the vulnerability of the command links and the impressive complexity of the preprogrammed attacks, SIOP-62 made the often-lamented dilemma of the massive retaliation threat all too real: faced with any serious nuclear provocation, a President would have to retaliate massively or not at all. Moreover, it was by no means certain that the choice would not quickly slip from his grasp, given the degree of control over the forces which the operational commanders actually possessed. OSD's main concern in issuing guidance for the SIOP-63 revision was to build fundamental distinctions into the plan--distinctions between countries being attacked,

TABLE 6

Single Integrated Operational Plan

Number	Effective Date of Coverage
SIOP-62	1 Apr 61-31 Jul 62
SIOP-63	1 Aug 62-14 Feb 63
Revision 1	15 Feb-14 Apr 63
Revision 2	15 Apr-30 Jun 63
Revision 3	1 Jul-31 Aug 63
Revision 4	1 Sep-31 Dec 63
SIOP-64	1 Jan-31 Mar 64
Revision 1	1 Apr-30 Jun 64
Revision 2	1 Jul-30 Sep 64
Revision 3	1 Oct-31 Dec 64
Revision 4	1 Jan-31 Mar 65
Revision 5	1 Apr-30 Jun 65
Revision 6	1 Jul-9 Nov 65
Revision 7	10 Nov 65-31 Mar 66
Revision 8	1 Apr-30 Jun 66
SIOP-4	1 Jul-31 Dec 66
Revision A	1 Jan-30 Jun 67
Revision B	1 Jul-31 Dec 67
Revision C	1 Jan-30 Jun 68
Revision D	1 Jul-31 Dec 68
Revision E	1 Jan-30 Jun 69
Revision F	1 Jul-31 Dec 69
Revision G	1 Jan-30 Jun 70
Revision H	1 Jul-31 Dec 70
Revision I	1 Jan-30 Jun 71
Revision J	1 Jul-31 Dec 71
Revision K	1 Jan-30 Jun 72

between elements of the target system, and between the timing of U.S. attack and that of the enemy. It was conceded that whichever gun was cocked in the midst of crisis would be the one to fire should the provocation become too severe. OSD under McNamara wanted to allow for the possibility of cocking less than the entire strategic force, and of directing attack at some appropriate subset of the target list.[94]

In accordance with the guidance issued by McNamara and his deputy, Roswell L. Gilpatric, SIOP-63 which took effect in August 1962, established 5 basic attack options. [redacted] In addition, SIOP-63 allowed for attacks on given countries to be withheld.[95]

The purpose of these provisions was to allow the President under crisis conditions to set the character of strategic operations that the U.S. forces would be primed to undertake. If, as seemed possible, SIOP execution should devolve from his control in the early stages of an actual war, he could still exercise some fundamental direction in advance by establishing [redacted]

a specific attack option. It was in this context that the doctrine of second strike counterforce gained its significance in application to force operations. That doctrine provided coherent arguments for the more restricted and less volatile options (3 and 4) and worked to establish the presumption that one of these options would be set as the basic plan under crisis conditions. Again, because of the vulnerability of the command and control system, such prior expectations, though subtly determined and difficult to measure, had great importance.

Once established, the list of basic attack options persisted throughout the period of study--albeit with some significant variation--and remained the primary mechanism for exercising positive Presidential authority after the initiation of war.* [redacted] attack

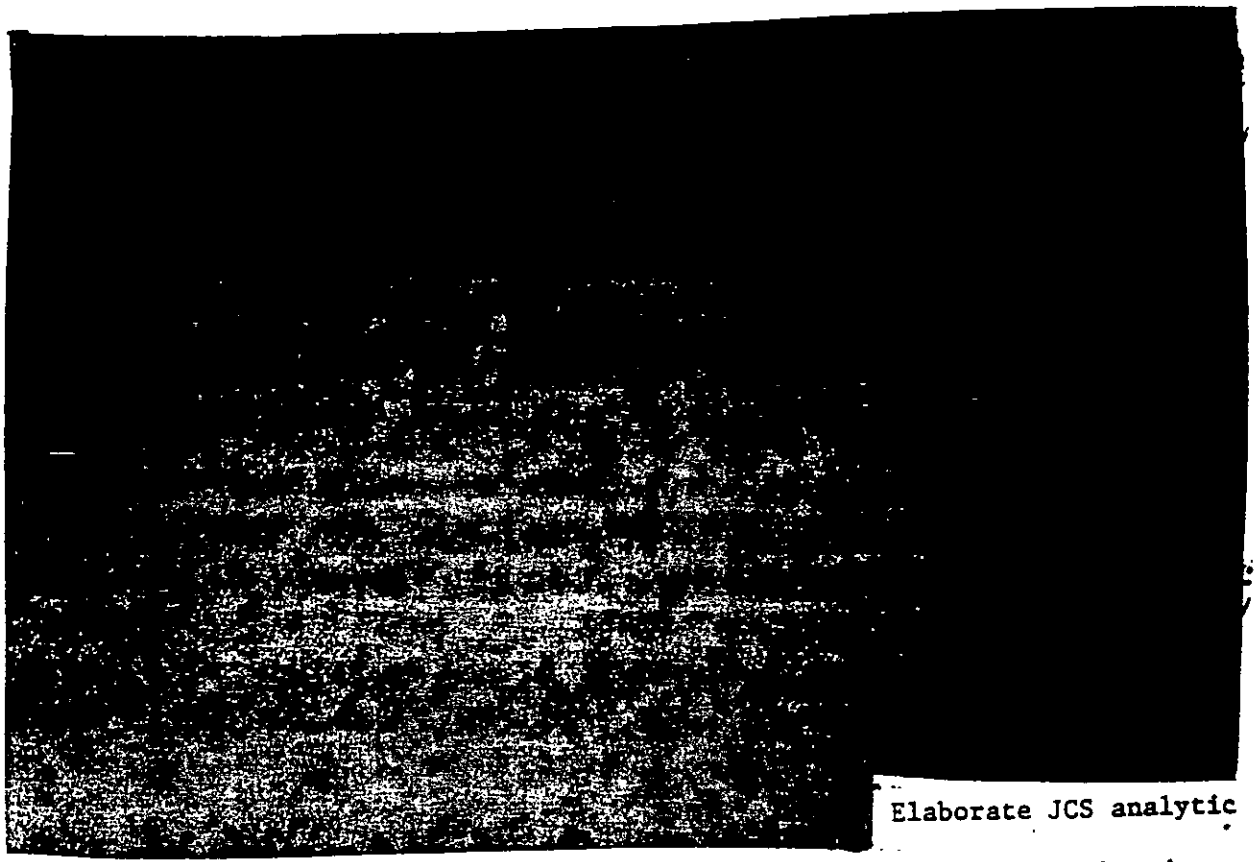
Table 8 (pp. 625-29) displays the

*Procedures for preventing unauthorized use of the strategic forces (negative control) prior to the initiation of war--that is, the use of special codes and dual key arrangements--are discussed in IDA Study S-467, "The Evolution of U.S. Strategic Command and Control and Warning.

basic attack options for SIOP-64 (revision 1), SIOP-4, and SIOP-4 (revision B), and in each case the strategic forces allocated to each target category. As these latter data suggest, all of the basic options set forth in the sequence of strategic plans entailed very large scale attacks on the Soviet Union.

The handling of Soviet command and control targets was a matter of ambivalence throughout the evolution of the strategic plan. Appreciation of the vulnerability of the American control system directed attention to the Soviet counterpart, but it also clearly suggested the dangers inherent in deliberate destruction of centralized control facilities. On the one hand, there was a possibility that an attack on the Soviet control system would incapacitate their entire force. This possibility offered some glimmer of hope--perhaps the only one--that a preemptive attack on the Soviet control system might in fact preclude major damage to the United States. On the other hand, it seemed far more likely that the collapse of the central Soviet command structure would lead to uncoordinated but enormously damaging response by individual force elements. A natural extension of the second strike counterforce doctrine imagined a bargained termination of war short of fully destructive nuclear exchanges, and this image clearly required that centralized command and control remain effective on both sides. [redacted]

7



Elaborate JCS analytic exercises* in 1969 and 1973 raised the question of whether dispersal and hardening of Soviet basic industry together with the smaller yields of U.S. warheads might not allow the Soviets to recover from nuclear attack sufficiently well to enjoy a meaningful strategic advantage.[101] The argument rested, however, on assumptions too extreme to cause serious concern; even a limited doubt could not be sustained as the development of multiple warhead systems drove the number of available weapons upward from [redacted]

By contrast, the evolving SIOP did not provide at any point a decisive damage limiting capability through preemptive counterforce attack. In the early 1960s, when the number of operational ICBMs in the American force

*These were major simulations which exercised the U.S. SIOP against a plan (labeled RISOP) constructed by U.S. planners for the Soviet Union.

far outnumbered the Soviet force, serious deficiencies in delivery system accuracy and target specification did not permit the achievement of the impressive U.S. counterforce capability that the favorable force balance seemed to make possible. Soviet medium-range capability against Western Europe, moreover, could not be denied even under the most favorable assumptions of relative U.S. strategic power.

By the time missile accuracy and geodetic information improved enough to make counterforce operations begin to appear feasible in terms of the conventional calculations of kill probability,* the Soviets had deployed an ICBM force of sufficient size, dispersal, and hardening to put decisive counterforce capability beyond reach. Moreover, continuing analysis of the effects of nuclear explosions gradually revealed that a number of phenomena not included in the standard calculations would significantly affect the outcome of an actual exchange. Some of these phenomena--such as electromagnetic pulses induced by high-altitude explosions, atmospheric ionization, and the dust stirred up by explosions near the earth's surface appeared to enhance the effectiveness of an unimpeded first strike, but to an extent very difficult to calculate with any precision. Since the same phenomena also offered the possibility of disrupting the execution of a first strike with a few very quick-reacting weapons, the net effect was subject to even greater uncertainty.**

*Kill probability was defined in terms of the number of attacking warheads; their accuracy and yield; and the hardness of the target. For a typical equation, see above, p. 585.

Other phenomena, such as the interference between attacking warheads due to the initial radiation pulse and to the debris sucked in near surface explosions, would clearly degrade a first strike. Many of the same phenomena, it was recognized, would also affect communications facilities, and thus further burden the central problem of conducting strategic warfare.[102] These complexities pushed the counterforce problem beyond coherent calculation. The standard formulae for kill probability against hardened missile silos were too simplistic to carry the burdens that decision-makers would have to face,

[redacted]

The SIOP, then, in all its versions gave as good a guaranty of the assured destruction mission as the limits of human performance were likely to allow, but accomplishment of the damage limiting mission depended on details of the actual combat situation which could not be guaranteed. Numerous military targets could be attacked, but there was only limited hope for significant damage limitation.

Command, Control, and Communications

The evolution of the command and control system and the communications net for the U.S. strategic forces is described in some detail in a supporting study.[103] That study documents various measures taken to reduce the vulnerability and upgrade the efficiency of the command channels--hardening of some components, construction of redundant communication channels, introduction of automatic data processing, and provision of mobile command posts for the President, his advisors, and the major operational commanders. The overall effort sought to give command systems both the physical capability to function under conditions of nuclear combat and the flexibility and

speed to process the vast amounts of information required to bring coherent direction to the exceedingly complex operations of the strategic forces.

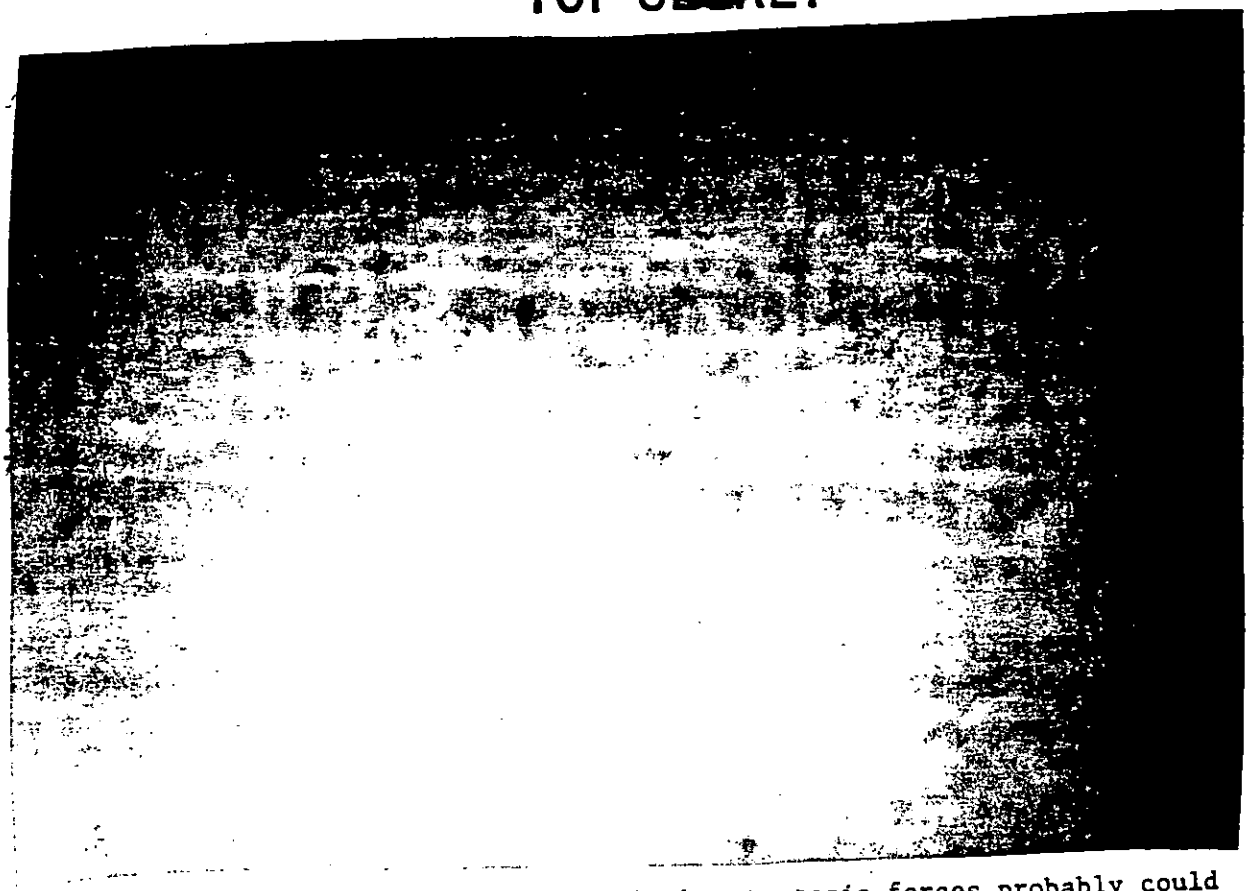
Over the course of the decade of the 1960s the programs undertaken to develop command, control, and communications capabilities brought major benefits to the normal peacetime operations of the strategic forces and enabled the responsible Services to master a large-scale and far-flung deployment of esoteric weapons. This progress, however, also served to deepen understanding of the extreme difficulty the system would face under any conditions of nuclear combat, let alone under an attack deliberately designed to incapacitate it. The stark fact was that a decade of serious effort did not bring assurance that the command system would be able to sustain coherent operation after the initiation of war--even given foreseeable technical evolution.[104]

The vulnerability of the system derived from a few simple facts. First, the deepest-held political values of the country required that authority over the use of nuclear weapons be centralized in the hands of the President or his constitutionally-defined successor. Because the President and his constitutional successors performed many functions, they could not be continuously protected against sudden attack. Enemy SLBMs could attack Washington with no tactical warning and eliminate the entire constitutional government. There would be no time for the national command authorities to reach either hardened or mobile command posts. Broad delegations of authority that had earlier been given to operational commanders were cancelled as part of the Kennedy administration's tightening of presidential control, and thereafter no officially established procedures

existed for devolving authority should the constitutional government be eliminated.[105] A major strategic opponent, therefore, could carry out air attack that would make command authority over the U.S. forces ambiguous.

Second, communication networks are so inherently vulnerable to nuclear weapons that even with considerable redundancy they would be severely degraded by attacks of even modest scale. Radiation effects disrupt high frequency communications over large areas for up to 24 hours after an explosion. Electromagnetic pulses would likely be devastating to land line switching stations and sophisticated electronic equipment. Both satellites and land-based propagation facilities are vulnerable to direct attack. [redacted] Without that system, any flexible operation of the strategic forces would have been impossible. The mobile command posts did not provide a fully integrated alternative system, and even if they could have survived--a matter not beyond doubt--their capabilities could have been severely degraded. [redacted]

The ultimate hedge against total collapse of the U.S. force structure from concerted attack against command facilities beginning in 1961, was the SAC Airborne Command Post (codenamed LOOKING GLASS), constantly manned and in



The point, then, is that although the strategic forces probably could not be completely incapacitated by an attack on the central command structure, they could very readily lose capability for exercising central coordination and direction, both of which require legitimate authority and extensive communications. If truly surprised by a competent Soviet attack, the U.S. strategic forces of the early 1970s could have managed an imperfectly coordinated execution of a basic attack option, but very little beyond that.*

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*The imperfectly coordinated character of retaliation *in extremis* would result from inevitable delays in the pre-established schedule, resulting from confused and frightened men making decisions under conditions where their authority to do so was questionable and the consequences staggeringly large.

Since this situation was fully appreciated in operational command channels, a strong incentive for preemption under crisis conditions, long feared in conceptual formulations of strategy, definitely existed. Once seriously aroused, the command structure of the U.S. strategic forces would generate very strong pressures for preemption; this was reflected in the guidance for the President which accompanied the SIOP. SIOP 4/F, for example, stated the problem as follows:[109]

[redacted]

Reconnaissance/Intelligence

Because of the sensitivity of the topic and the elaborate security which inevitably surrounds it, the importance of reconnaissance and intelligence in the development of the U.S. strategic forces is not widely appreciated, and it does not appear to be well documented even in the classified record.[110]

Nonetheless, it is apparent both by inference from the context of events and by direct testimony of central participants that the organizational and technical evolution of the intelligence function broadly construed has been one of the most significant dimensions of the history of strategic forces.

Not only have the products of intelligence been critical to operational capability, but the organizational arrangements made to provide them have been important in balancing overall control of strategic force operations. In brief, control over strategic intelligence was sharply contested among SAC, the CIA, and the civilian political leadership, and its ultimate disposition under separate organizational arrangements dominated by civilian authorities imposed a major constraint on the power and authority of the Strategic Air Command.

The principal intelligence problem pertaining to strategic force operations was not so much the size and technical character of the enemy forces as the more demanding question of the location of enemy targets. The existence of a given military or industrial installation could be determined much more readily than its actual geodetic coordinates. Even given the power of nuclear weapons, it was still necessary to locate targets reasonably precisely if military capabilities and specific industrial capacity were to be destroyed. Indiscriminate destruction of urban buildings and populations could be accomplished without precise target location, but not more refined uses of strategic power. Even strategic bombers, which had better rated accuracies than the missiles of the 1960s and which could search for the target to some extent, would not have been able to carry out a discriminating attack unless the target location was known within a few miles--less than 10. The operational constraints imposed by low-altitude penetration and flight plans designed to avoid enemy defenses, and the tight timing required in conducting nuclear missions, would not allow extensive search for incorrectly located targets even if the aircraft and their crews had been well equipped to conduct it.

Information on the location of targets comprising the NSTL developed gradually from a variety of sources, including maps and aerial reconnaissance information gathered by the German forces and seized by the U.S. Army at the end of World War II. The overall information base varied a great deal in quality, and it could not be unambiguously related to a single consistent system of coordinates covering the vast geographic area within which attacks were being planned. The consequences became apparent when the Discoverer satellites began returning high quality photographs in 1960 and 1961. The early satellite results revealed substantial geographic errors in the target lists, affecting as many as 40 percent of the listings, but these data did not by themselves allow the necessary corrections to be made.

In addition to target locations, there was also great concern in the operational forces with detailed information about the extensive Soviet air defense system, since bomber and tactical aircraft penetration plans depended to some extent on exploiting gaps and tactical weaknessess in that system. The operational commanders, who naturally wished to preserve their capabilities beyond the initial attacks and who had not been trained to expend men and aircraft in the same manner as ballistic missiles, devoted themselves intensely to this dimension of the problem.

As discussed in previous chapters,* Air Force aerial reconnaissance capability had been rapidly reconstituted when the Korean War broke out, and SAC soon began extensive reconnaissance operations which included frequent penetrations of Soviet airspace. Because of their extreme sensitivity, these operations were conducted under highly protected arrangements with cover stories which were maintained even within the formal U.S. command channels. Though basic authority for these activities

*See above, pp. 181-82.

was given by President Eisenhower, who seems to have been generally cognizant of their existence, operational details were held by very few people, chiefly within the Air Force. In effect, a third, separate organizational channel began to develop with control over elements of the overall strategic mission. This activity stood apart from the force design and procurement cycle associated with the budget process and even from the operational planning cycle that generated the SIOP, though SIOP planners did use targeting data from reconnaissance operations.

This Air Force reconnaissance operation provided much of the personnel and organizational context for developing the technical support and critical skills needed for modern strategic intelligence--photointerpretation, geodesy mapping, development of numerous optical and electronic instruments, etc. As this organization evolved under security in the early 1960s nearly as strict as that of the Manhattan Project in its early days, the problem of target specification was gradually solved, but not until 1965 at the earliest. The attack aspirations incorporated in the SIOP remained unrealistic until that date.

The significance of control over this separate and highly restricted organizational channel was apparent to those aware of the situation. SAC, under the strong leadership of General Power (1957-64), aspired to attain full control over the strategic mission; in the late 1950s it developed an elaborate plan for the technical processing of reconnaissance information in Omaha. This plan would have given SAC the same dominance over the developing strategic reconnaissance program and the resulting flow of strategic information that it had acquired over SIOP preparation. Were these two critical channels affecting force operations to come under SAC

control, effective authority over the strategic forces, particularly in a military crisis, would obviously devolve on SAC with the general authority of higher military and civilian officials dependent upon highly vulnerable communications links. General Power and his colleagues at SAC deeply felt that both military tradition and the exigencies of nuclear warfare demanded such an arrangement.

Many of the civilians and professional intelligence officers involved felt just as intensely that such an arrangement would constitute a dangerous concentration of power. The CIA, involved in the issue because of its sponsorship of the U-2 program, argued that fully informed analysis independent of an operational service was a necessity to maintain a high quality intelligence product. Others, cognizant of the aerial reconnaissance activity of the 1950s, argued the necessity of having high level control over reconnaissance operations.

The struggle over this issue became intense and protracted, with Power and McNamara becoming the chief protagonists of the respective positions in the latter stages. The outcome was that reconnaissance operations involving the satellite programs, as well as photointerpretation and other elements of technical support, were centered* in Washington under civilian authority vested in the Forty Committee operating under the NSC. This arrangement was established by the time of General Power's retirement as SAC commander in 1964. Heavy security prevented any broad or directly expressed political repercussions, but the battle over control of reconnaissance was one of the more important episodes in the development of the U.S. strategic forces.

*Many of the technical components of modern reconnaissance capability were inevitably duplicated at SAC.

Experience

Were men of ages past somehow able to view and comprehend the development of the American and Soviet strategic arsenals just described and the political context in which it occurred, the wisest of them, rather than boggling at the marvels of modern technology, would more likely wonder that international life could be conducted so precariously without the great antagonists at some point stumbling into massive conflict. The extremely large destructive forces poised for attack on short notice and controlled by such complex organizations would seem in the perspective of history doomed to certain war. It seems in that perspective to be a great achievement of human rationality that nuclear war has not occurred, that the purposes of deterrence have so far been achieved.

Because this achievement is not without ambiguity, it should not be assumed that it will extend indefinitely into the future. We do not know to what extent the absence of major war is due to the assured destruction threat or to other factors. We do not know where the limits of the established system of mutual deterrence might be. We do not know what events might precipitate responses which go beyond the capabilities of high level civilian and military authorities in both the United States and the Soviet Union. We certainly prefer ignorance to the circumstances which would give clear answers to these questions, but it is nonetheless important to interrogate closely even the very limited evidence contained in the experience accumulated to date.

The interpretation of the record is difficult because experience with fully implemented mutual deterrent capabilities is more limited than is

often assumed. Though both the United States and the Soviet Union have possessed nuclear weapons in some form for more than 30 years, fully integrated strategic nuclear capabilities are not nearly as old as that. It required many years to develop the organizational and technical capabilities required to execute a deliberately controlled nuclear attack. The United States did not solve even some of the known problems until 1965 and thereafter. Since the Soviet Union has lagged considerably behind in most of the observable dimensions of strategic power, it is likely that it evolved a fully integrated force structure with operational planning scaled to actual technical capability even later than the United States. By the 1970s, however, both sides possessed fully matured strategic capabilities; this created a distinctly different situation. There simply has not been much time to test the consequences of that situation. Most notably, there has not been a severe crisis with the strategic forces in their more advanced configurations.

Despite all the ambiguities and necessary qualifications, however, it is useful to reflect on the one serious crisis of the nuclear age--the confrontation over Cuba in 1962. Though it occurred with the strategic forces on both sides at early stages of development, it does offer insight into the problems of strategic force operations which have not obviously been eliminated by subsequent developments and perhaps have even been intensified. There are two aspects of the episode which seem to have general significance.[111]

The first concerns the performance of the reconnaissance/intelligence services. The events of the crisis make it clear that U.S. intelligence performed excellently in spotting and correctly interpreting deployment of Soviet MRBMs and IRBMs in Cuba once preparation of field sites began.

Such coverage and analysis was then and has been ever since a major strength of the U.S. intelligence program. It is equally apparent, however, that U.S. intelligence did not learn of the Soviet decision to undertake the Cuban deployment and could not penetrate the diplomatic deception which the Soviets used to cover the operation. Moreover, U.S. intelligence did not pick up the related and substantial movements of men and equipment within the Soviet Union. Similar problems occurred in connection with the Soviet invasion of Czechoslovakia in 1968. U.S. intelligence did not pick up the decision to undertake the invasion and did not assess correctly the large invasion force moving on Prague. Both episodes indicate strong limitations on acquiring operational intelligence, and both reveal a continuing sensitivity in the U.S. strategic posture. American fears of a surprise attack derive in part from the fact that the intelligence system is vulnerable to deception and has been deceived at important junctures in the past.

The events of the Cuban crisis also revealed the difficulties which high level political and military authorities have in controlling extensive, complex force operations, even under relatively favorable conditions. The U.S. civilian and military leadership was highly integrated under the ad hoc Executive Committee procedure, and the President and his advisers gave undivided attention to the problem. Nevertheless, some critical elements of the situation slipped from their grasp, even though the pace of events was more moderate than might be expected in crises involving the most advanced contemporary weapon systems.

One such element was the alerting of the strategic forces. Because they desired to be ready to respond before the Soviets could anticipate it, the

President and the Executive Committee did not want observable preparations to begin until the policy was fully worked out and on the verge of announcement. The alert of the strategic forces was not ordered until 22 October. From the exceedingly rapid compliance and from the testimony of some participants, it is apparent that SAC began the critical and complicated force generation process, in effect went on alert, before it was officially ordered and before it was desired by the Executive Committee.[112] The reasons are not difficult to fathom: The operational commanders, with a great deal at stake, could not be kept entirely ignorant of the pending crisis. They possessed a great deal of discretion to undertake preparations in advance of the anticipated alert, and for them the readiness of the forces was considerably more important than the subtleties of diplomatic signaling.

Even more important, the Executive Committee did not control what the Soviets probably perceived as the fundamental American military response. The President and his colleagues on the Executive Committee decided on a quarantine blockade of Cuba to impose direct pressure on the Soviets while giving them ample time to concede the issue gracefully. In executing this plan, the committee decided which ships were to be intercepted and where, and considered these decisions to be critical in managing the crisis. There are accounts of an emotional confrontation between Secretary McNamara and the Chief of Naval Operations, Adm. George W. Anderson, in the Naval Flag Plot over the implementation of these orders, but all that was entailed is not often recognized.[113]

The angry words between McNamara and Anderson grew out of the Admiral's reluctance to respond to the Secretary's question regarding a United States destroyer deployed well off of the blockade line. That destroyer, it turns

out, was involved in a massive antisubmarine warfare (ASW) operation which the Navy conducted throughout the Atlantic in support of the blockade. That dimension of the Navy's activities had not been explicitly anticipated by the Executive Committee and was certainly not at the center of its plan.[114] From the Soviet perspective, however, this was quite possibly the central feature of American actions, for the cruise missile submarines, which were the target of the U.S. ASW operation, were presumably the one element which they might rely on to pose a basic deterrent threat. The Soviets had very few deployed ICBMs at the time, and those seemed to be in a low state of readiness.* Similarly, the Soviet bomber force was not sufficiently on alert or well enough exercised to justify much confidence in it. Cruise missiles on submarines, though not advanced weapons, could have effectively attacked American coastal cities, and that gave the Soviets a direct deterrent capability. That the U.S. Navy was busily trying to take it away from them** with some degree of success was undoubtedly a highly salient, perhaps dominant fact; but it was not something that President Kennedy and his Executive Committee intended. In fact it appears they did not know it was happening.

The operations of American strategic forces have become much more extensive since the Cuban crisis and in many ways more complicated. Though again it is not an easy matter to test realistically, it is a reasonable judgment that they have become more difficult to control under crisis conditions. The limited experience to date constitutes a vague but significant warning.

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*The Soviets undoubtedly realized that the United States would monitor the readiness of their forces as an indicator of their intentions and that they therefore could not order dramatic alert procedures without worsening the crisis. It is generally believed that throughtout the crisis their forces remained much less alerted than those of the United States.

**By tailing the submarines the Navy could assure that they would not be able to fire their missiles.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

CHAPTER XII

THE SOVIET PROGRAM AFTER 1964

As detailed in Chapter XI, in the process of imposing constraints on the U.S. strategic program there developed by 1965 a well-articulated American conception of Soviet strategic intentions. As a central element of his resistance to substantial increases in the U.S. strategic forces for the damage limiting mission, Secretary McNamara argued that any procurement beyond the U.S. force ceilings imposed in 1965 would stimulate an offsetting Soviet reaction intended to protect their own assured destruction capability.[1] That argument required at least two critical assumptions: (1) that the Soviets accepted the assured destruction mission--and the concept of deterrence which justified it--as the central objective in planning the size and technical structure of their strategic forces; and (2) that in the absence of further increases in U.S. forces, the Soviet program would remain relatively more modest. The latter assumption appeared in official intelligence estimates in 1965 which projected that the Soviet program would stabilize at approximately 700 ICBMs. (See Table 1, p. 631).

This image of Soviet intentions fitted naturally into the logic used to organize U.S. defense policy, and that undoubtedly facilitated the broad acceptance which McNamara's propositions soon enjoyed. According to U.S. calculations of the strategic force balance--which excluded, as we have noted, the command and control element--the Soviets had little prospect of conducting successful counterforce operations with their emerging force structure, and hence the assured destruction mission was all that seemed

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TABLE 1

NATIONAL INTELLIGENCE ESTIMATES OF SOVIET STRATEGIC FORCES (AS PROJECTED TO 1975)

Document	Date of Issue	Estimate of Soviet ICBM Force Inventory As of Mid-Year:						
		1964	1965	1966	1967	1968	1969	1970
NIE* 11-8-64	Oct 1964							
a) Majority estimate		197	235-260	285-320	330-395	360-475	410-590	410-700
b) AF dissent		240	275-325	325-425	380-525	450-629	525-700	600-900
NIE* 11-8-65	7 Oct 1965							
a) Majority estimate			224	310-364	420-476			500-800
b) AF dissent			260	400-450	475-575			600-900
c) DIA dissent								400-700

*A range of 500-1,000 was quoted by the majority for mid-1975 i.e., 10 years from the point of estimate. An Air Force dissent estimated the Soviet program at over 1,000 by mid-1975. A DIA dissent set the mid-1975 range at 500-800.

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open to them. American analysts held a deep belief that the Soviets would demand an assured destruction capability even if they could accomplish nothing else, since that seemed to be an unshakeable axiom of rational behavior in the nuclear era. There appeared, moreover, to be little incentive for the Soviets to attempt more, since the United States, it was expected, would at least match any increases in the Soviet program beyond the American level of effort.

In addition to these logical assessments, in some areas of the U.S. Government the argument may have contained an element of signaling--that is, a reasonable conscious attempt to persuade the Soviet Union that modest strategic forces ought to be their intention. The Johnson administration had already advanced through specific diplomatic channels the idea of a freeze on strategic weapon systems,[2] and U.S. intelligence projections served as a means of articulating hopes and tacit demands as well as objective expectations. Though there was no attempt to influence the projections for this purpose, their publication in congressional testimony could be expected to work to this effect.[3]

In retrospect, however, it is apparent that by 1965 the Soviets had already decided upon strategic programs which at least in size, and probably in mission orientation as well, violated U.S. assumptions of the period.* The weight of evidence suggests that the major programming decisions for

*Such errors in judgment can be objectively seen as a result of the great complexity and uncertainty of the topic. Since there has been considerable recrimination about the inaccurate estimates, however, it should be noted that the errors made in the mid-1960s were very different in character from those of the late 1950s. In the wake of Sputnik there was uncertainty about immediate Soviet capability. By 1965 estimates of the immediate balance were both clear and accurate, and the errors of judgment involved 5-7 year projections of the Soviet forces.

the SS-9 and the SS-11 ICBM deployments and for the SS-N-6 deployment in the Yankee-class submarine came in the wake of the Cuba missile crisis and in the Five-Year Defense Plan established in 1965. The evidence also indicates that development of the fourth generation of Soviet missiles--the SS-16, -17, -18, and -19 and the SS-N-8, which include MIRV capabilities--was also part of the 1966-70 defense plan decided upon in 1965.

These data suggest that the Soviet strategic program, like the U.S., derived its fundamental character from decisions made during a critical, formative period, 1957-59--when the political leadership first agreed on large-scale deployment of strategic range ballistic missiles and added a new dimension, the Strategic Rocket Forces, to the nation's military establishment. Though the results of these decisions evolved gradually in the ensuing years (field installations, organizational units, personnel assignments, and budgets necessary to pay for them) and though the eventual outcomes undoubtedly reflected incremental adjustments, the most important decisions on force structure seem to have been episodic rather than continual. The most critical episode, moreover, appears to have ended in 1965. By that date, the Soviets had probably formulated their basic strategic intentions, and that simple fact is obviously of great significance.

Given that supposition and that the decisions made in the critical episode were not understood in the United States at the time, it is particularly important to analyze the evolution of the Soviet forces after 1965 in relation to events of the formative period. If American

misconceptions can be corrected without creating new ones, it is obviously desirable to do so. It should be recognized, however, that the massive uncertainty which occasioned the American misconceptions of 1965 did not dissipate with the flow of subsequent events. Intelligence on the Soviet decision process improved significantly in the ensuing years but still did not provide systematic and detailed access to Soviet plans, intentions, or internal analyses. U.S. analysis of the Soviet program continued to depend on inferences drawn by long chains of logic from observable activity at test ranges, manufacturing facilities, and field deployment sites, and such analysis remained very sensitive to the assumptions applied. The current study cannot transcend those constraints.* The history of the Soviet strategic program is at the same time a history of U.S. perceptions.

Under the circumstances, the only practical refuge for objectivity is the explicit construction of alternative, competitive conceptions of Soviet strategic developments. The historical record does offer some support to quite different interpretations of the Soviet strategic program, even if one accepts the proposition that the fundamental character of that program was determined before 1966. The most reasonable analysis of the period consists of a comparison and assessment of these differing interpretations.

*Historians usually constrain uncertainty by focusing on events which have some natural closure. Such things as the end of a war or the collapse of a regime provide something approximating a final outcome to a sequence of events, and knowledge of the outcome gives substantial analytic leverage over interpretation of preceding events. The competitive deployment of strategic nuclear weapons by the United States and the Soviet Union does not have anything approaching a final outcome, and interpretation is consequently a great deal more ambiguous.

Basic Characteristics of the Soviet Program

Since U.S. intelligence on the Soviet strategic program has been so dependent on the observation of concrete events through objective means, some time passed before the Soviet effort had evolved sufficiently to provide a series of observable events from which meaningful patterns might be derived.[4] A base of observation existed by 1965, however, and, as the Soviet effort unfolded thereafter, some fundamental characteristics did become apparent providing a common point of departure for competing interpretations as to what it all might mean. Apart from the counting of deployed weapon systems, as summarized in Table 2 (p. 636), these basic observations chiefly concerned the research and development program for strategic weapons, the organizational arrangements for planning strategic deployments, and the timing of major deployment decisions.

Patterns of Research and Development

As noted in previous chapters, activity at the principal test ranges--Kapustin Yar, Tyuratam, Plesetsk, Sary Shagan, the northern fleet missile complex, the Pacific fleet missile test range--and at the warhead impact area on Kamchatka--provided the means for distinguishing separate weapon systems under development and understanding their technical characteristics. By 1965 a number of useful patterns had been established. New weapons generally involved either the construction of new launch sites at the test ranges or major alterations to existing facilities. At least for land-based offensive weapons, the particular location of a new or converted launch site gave reliable indication of the purpose of the

TABLE 2

United States and Soviet Strategic Offensive Forces
1961-1974 (Mid-Year)

	61	62	63	64	65	66	67	68	69	70	71	72	73	74
ICBMs*														
US	27	78	352	816	854	934	1054	1054	1054	1054	1054	1054	1054	1054
USSR	4	38	91	191	224	239	514	796	1018	1291	1489	1527	1527	1587
SLBMs														
US	80	144	192	336	464	592	656	656	656	656	656	656	656	656
USSR	75	108	108	108	101	107	107	121	196	304	429	499	589	684
Bombers														
US	1645	1656	1426	1277	1030	749	697	648	597	515	466	449	426	424
USSR	145	160	165	170	170	165	165	165	160	155	155	155	155	155

Source: Data provided by CIA, NIE Historical, Feb 77

*Launchers

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weapon and the particular design bureau involved. Prototype installations constructed at Tyuratam, for example, revealed the design of field deployment sites for the land-based offensive systems, and the beginning of construction of the operational sites usually coincided with the beginning of flight testing at the test centers. A normal pattern of R&D testing before deployment was established for different missile systems, and analysts learned to recognize the onset of missile firings for the training of operational troops as a clear phase in the deployment process. Once the process had run to completion for a number of the early weapon systems, analysts were able to recognize the testing of major components--particularly rocket engines--prior to testing of the full system, and a reasonably clear picture of the overall R&D cycle began to emerge. As evidence accumulated for a number of systems, a normal schedule for the development and deployment of a major strategic missile system in the Soviet Union could be established. The SS-9 program summarized in Table 3 (p.638) exemplifies a schedule which, though highly concurrent and tightly programmed, is nonetheless considered normal for the Soviet Union. The SS-11 program (Table 3), with test firings occurring at a much greater rate and silo construction at missile deployment complexes beginning a year in advance of the test firings, seems to have been on an accelerated schedule.

Five-Year Planning Cycle

A second basic observation about the Soviet program is that, at least beginning in 1965 (and perhaps as early as 1958), major force

TABLE 3

SS-9 AND SS-11 DEVELOPMENT AND DEPLOYMENT DATES

	1st construction of test site at Tyuratam	1st construction of prototype field site at Tyuratam	R&D test launches #1	#20	#30	1st construction at deployed complexes	1st silo construction at deployed launch sites	1st troop training launch	1st operational capability	1st launch of mod 2 variation	100th test launch
A) SS-9 System	Nov 62	Nov 63	Dec 63	Oct 65	Dec 65	Nov 63	Jan 64	Nov 65	Early 66	Oct 64	Jun 70
B) SS-11 System	Feb 64	Feb 64	Apr 65	Apr 65	Aug 66	Feb 64	Feb 64	Early 66	Mid-66	Jul 69	Jul 68

[redacted]

programming decisions were taken by means of a 5-year defense plan corresponding to the 5-year planning cycle for the economy as a whole.* A 5-year defense plan was debated and adopted in 1965 to cover the period 1966-70, and though marginal adjustments were made during the period, further major force programming decisions apparently awaited the next planning cycle. The successor plan, constructed and debated in 1970, was promulgated in late 1970 for the 1971-75 period. The evidence is that R&D for the fourth generation Soviet systems was programmed in 1965 for the 1966-70 plan and that the deployment of these systems was part of the 1971-75 plan. Since these defense plans are not rolling 5-year projections updated annually (as in the United States), but rather work in sequence, the clear suggestion is that major Soviet force structure decisions are organizationally programmed to be episodic in character and to occur at predictable points in time.

Organizational Consolidation

The third general characteristic of the Soviet program after 1965 is its integrated, highly centralized management. Organizational consolidation of the Defense Ministries under D. Ustinov occurred in 1964-65 and control over production facilities for the ICBM program became

*The existence and importance of the 5-year defense plans has not been a matter of general agreement within the U.S. Government. There is direct evidence of recent origin for the existence of such plans, however, and in addition a great deal of serious circumstantial evidence. Given that the military sector is a significant part of the Soviet economy--at least 10 to 20 percent according to late 1970s estimates--it is a reasonable supposition that the Soviets would virtually be forced to construct a defense plan on a cycle corresponding to that of the general economic plan.

centralized in the Ministry of General Machine Building. By 1968, Grechko as Defense Minister, Ustinov as the Communist Party's overseer of the defense sector, and Smirnov as Chairman of the Military Industrial Commission had emerged as the central and apparently dominant managerial figures. The experience, expertise, and long tenure of these men, the highly authoritative planning mechanism over which they presided, and their very close integration with Brezhnev and other political leaders in the Defense Council created at least some of the organizational conditions required for development of a highly coherent, explicitly planned military program, but these organizational arrangements appear to have evolved after many of the major decisions on the structure of Soviet strategic forces had already been made. Evidence that the Defense Council plays a central role in coordinating strategic policy dates from 1968.

Major Points of Decision On Offensive Missile Deployments

A fourth set of observations concerns the offensive missile program. As the actual pattern of Soviet strategic deployments emerged, evidence accumulated which allowed reasonable inference regarding the timing of critical programming decisions for the Soviet offensive forces. From 1958 to 1972 there were seven occasions on which major decisions affecting the overall offensive force structure seem to have occurred:

Mid-1958

Retrospectively, a number of sharp changes occurred in the Soviet ICBM program in the third quarter of 1958, apparently reflecting decisions made in the process of preparing the Seven-Year Defense Plan for 1959-65.*

*One can hypothesize that the weapon programs decisions made in 1958 required major revision of the current Five-Year Plan and that the Seven-Year Plan was therefore stimulated by these changes.

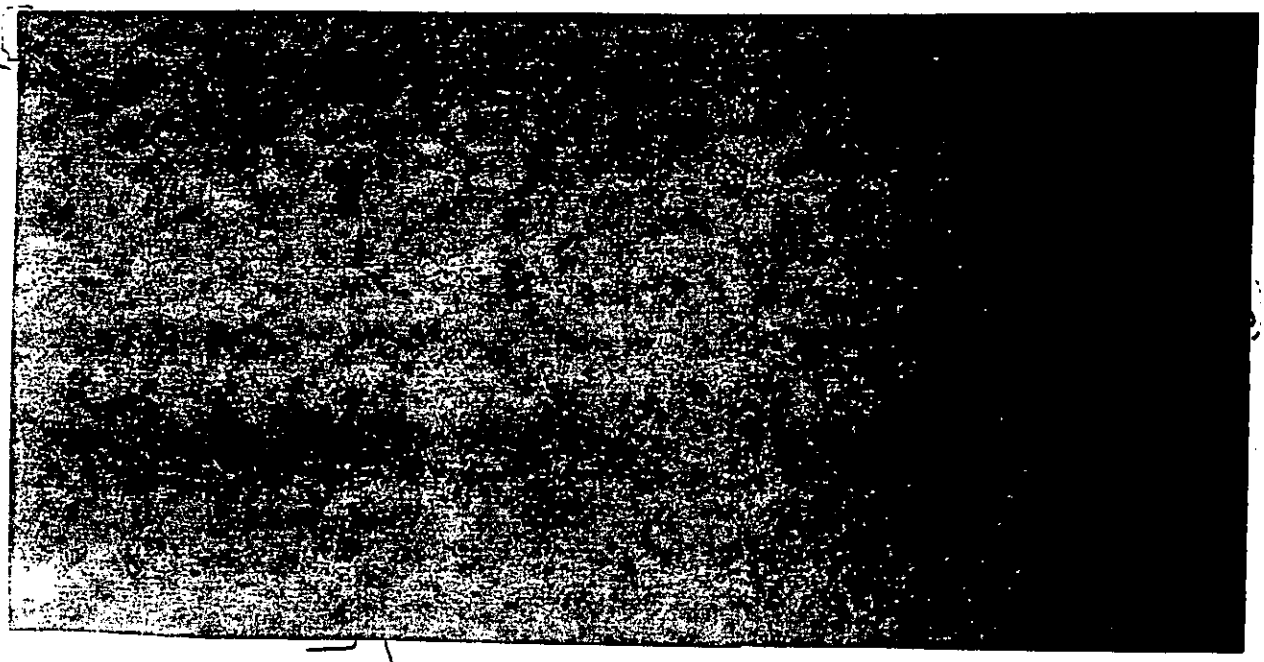
The rate of test firings of the main ICBM program of the time--the SS-6--diminished markedly, and construction halted at field construction sites which in retrospect seem to have been intended for SS-6 deployment.* Construction continued at [redacted] but the very limited deployment which eventually emerged there -four operational missile launchers--suggests rather clearly that the originally intended complex had been truncated.** The clear suggestion is that the SS-6 program was cut back in 1958 after the process of deployment had begun.

Mid-1962

During the summer and early fall of 1962 a number of basic changes in the deployment pattern for the SS-7 and SS-8 suggest major decisions taken earlier in the year. In July and August, construction activities at the SS-8 sites [redacted] stopped and the sites were abandoned. This proved to be a permanent halt to the SS-8

[redacted]

program.* In addition and virtually simultaneously, construction also stopped at some [redacted] other locations which may have been involved in the ICBM program. Five of the sites [redacted] subsequently became special operations complexes involved in [redacted] and nuclear warhead storage and support, with construction for this latter purpose beginning a year or so later.** The other 2 locations, [redacted] did eventually become SS-9 complexes, but construction there stopped for 18 months and restarted on the same schedule (noted below) as [redacted] additional SS-9 complexes. These changes reflect significant cuts in the planned ICBM deployment, but it is striking that a number of additions to the Soviet missile forces began at the same time. Between September and December, [redacted] new soft launcher sites for the SS-7 were started and in September construction began to convert the [redacted] complex, previously associated with the SS-8, to the



SS-7. In October and November R&D testing began for [redacted] versions of a new reentry vehicle for the SS-7 which reduced the accuracy of the warhead but allowed increases in the yield.* And finally, of course, the deployment of SS-4 and SS-5 missiles to Cuba in the fall of 1962 coincided with this series of adjustments to the ICBM program.

Mid-1963

A number of dramatic shifts in the Soviet program which became apparent in early 1964 make it clear that a major reprogramming of the entire offensive force structure must have occurred during the first three quarters of 1963. During the second half of that year, no new ICBM launcher sites were begun and construction was halted at [redacted] SS-7 launcher sites [redacted] and at least [redacted] SS-5 IRBM site. These sites were ultimately abandoned. Then, in the first half of 1964 construction began on new launcher sites at [redacted] ICBM complexes, beginning the deployment of the SS-9 and SS-11 third generation missiles. Of these construction projects, [redacted] were entirely new complexes for the SS-9 program. In addition, new sites for the SS-11 missile were begun at [redacted] SS-7 complexes and at 1 SS-5 complex, the SS-11 complexes overlapping the completion of the

[redacted]

final SS-7 launch sites. Construction also began in late 1963 on the facilities at the Severodvinsk shipyards for production of the Yankee-class submarine.

Construction of the field single-silo prototype for the SS-9 began [redacted] in November 1963, and the first test flight of the missile from a [redacted] occurred in December. The cylinder for the SS-11 missile was displayed at the Moscow parade in November 1963, even though the initial test site [redacted] was not begun until February 1964, and the first test launch of the missile did not occur until April 1965. Some 290 SS-9 missiles and 400 SS-11 missiles eventually appeared at the ICBM complexes initiated in 1963-64.

1965

In addition to direct evidence of decisions reached in 1965 in connection with a new 5-year plan, one can infer the existence of such decisions from a second set of SS-11 deployments which began in early 1966. Construction of SS-11 launch sites at [redacted] additional ICBM complexes began during the first few months of 1966. The complexes at [redacted] all contained operational SS-7 or SS-8 missiles, as had been true of the [redacted] SS-11 sites started 2 years earlier. But construction of the last SS-7 launchers at all of these complexes had ended 1 to 2 years previously. Since this hiatus of activity indicates either the idling of construction crews or an expensive shift away from these sites and then back again, it is a reasonably clear sign that a separate deployment decision for the SS-11 was made in 1965.

This second phase of the program, ultimately involving [redacted] launchers, nearly doubled the previous deployment. If one assumes that the SS-11

sites at the [redacted] complex (80 launchers), which were not started until early 1967, were also programmed in 1965, then this more than doubled the SS-11 force. Field sites for the SS-13 were also begun in mid-1967.

1968

During 1968 there began a series of adjustments in the overall Soviet missile deployment program which apparently related to medium-range capabilities covering the periphery of the Soviet Union. In July 1968 there occurred [redacted] tests of the SS-11 missile at a sharply reduced range of 500 n. miles*, and in August construction began on new SS-11 launcher sites at the complexes [redacted] which contained SS-4s and SS-5s.[5] [redacted] This pattern of adjustments suggests that some portion of the SS-11 deployment was directed at medium-range targets in replacement of SS-4 and SS-5 systems, whose deployments had begun 10 years earlier, and that remaining SS-4 emplacements were intended for shorter range targets where their accuracy would be greater.

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*The normal test range for the SS-11 is 3,400 nautical miles, observed on 202 of 265 test firings through July 1973.

In a separate development, construction began in 1967-68 for operational deployments of the SS-9 mod 3 and mod 4 at the Tyuratam test center and new warhead facilities at the SS-9 complex at [redacted] for the SS-9 mod 4. This deployment seems related to reduction in the readiness state of 30 SS-7 launchers in 1971-72 after construction at [redacted] was completed.

1970

Major decisions in the spring and summer of 1970 regarding modernization of the Soviet force structure can be inferred from systematic shifts in the deployment pattern beginning in the fall and in early 1971. In September and October 1970, launcher sites under construction were abandoned at [redacted] ICBM complexes involving the SS-9 and SS-13 programs.*

Then in late 1970 and early 1971 new silo construction for the fourth generation missiles began at [redacted] ICBM complexes. This activity involved new construction for the 3-warhead version of the SS-11 (the SS-11 mod 3) as well as sites now associated with the SS-18. It is also quite likely that the decision to produce Delta-class submarines, which carry the longer range SS-N-8 missile, was made in 1970. The first of these submarines underwent sea trials in 1972, and given the 18-24 month construction time at Severodvinsk, must have been started in early 1971, corresponding with the start of the silo conversion.

At [redacted] of the [redacted] established SS-9 complexes construction began in late 1970 and early 1971 for new [redacted] silos/[redacted]

new [redacted] silos were started in one established launch group in each complex, thus adding [redacted] new silos to the force structure program. In the SS-11 program in 1970, [redacted] new launch groups of [redacted] silos each accounted for a total increment of [redacted] silos to the force structure. These new launch groups were located at [redacted] which first appeared in 1968 and which suggests a peripheral mission assignment.

1971

In mid-1971 there was a major adjustment of the fourth generation deployment plan as set forth in the 1970 decisions. Construction of the new [redacted] silos at the [redacted] SS-9 complexes as well as construction of the new [redacted] at the SS-11 complexes halted concurrently, and at least for a few months there was no construction at all at ICBM deployment sites. The interruption in construction of the new [redacted] silos, which ultimately were fitted with SS-18 missiles, lasted from 18 to 48 months.** When the deployment programs resumed in 1973 a number of characteristics (discussed in more detail below) had changed, and it was apparent that fundamental decisions affecting the overall strategic force structure had been made during 1971.

Defensive System Deployments

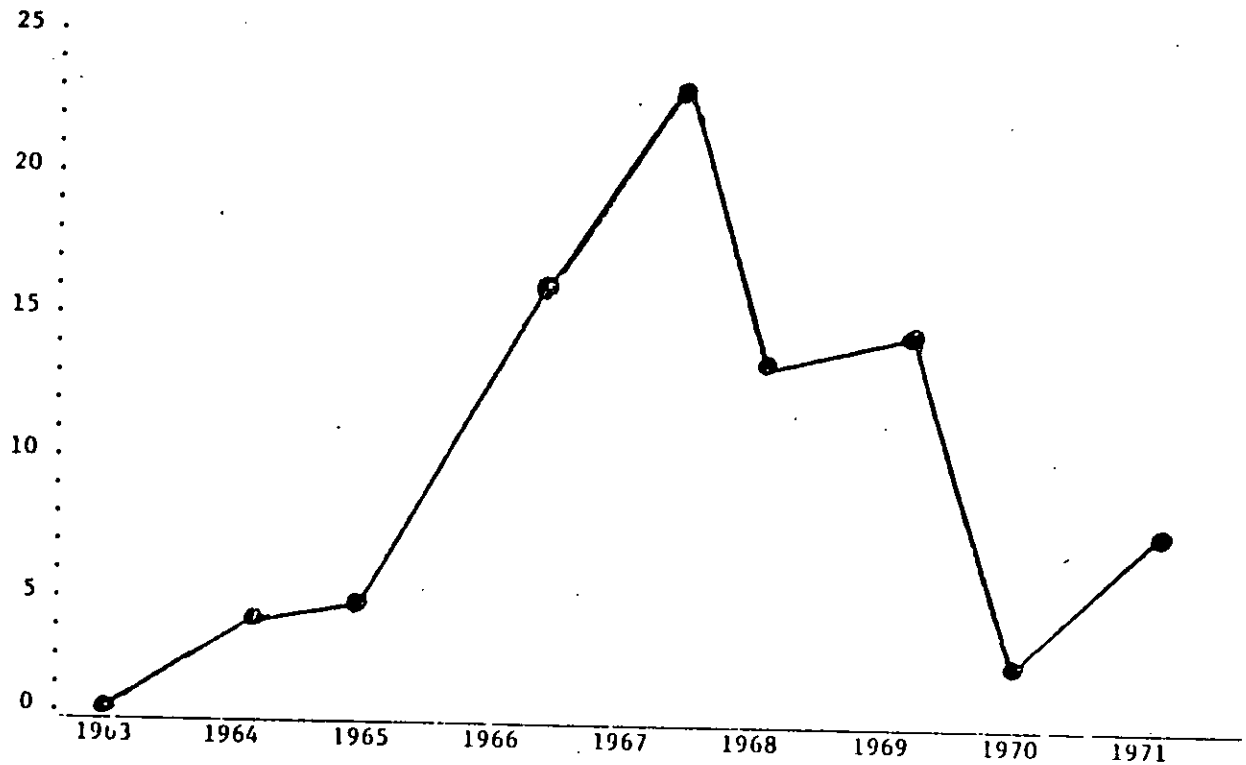
A final set of observations, concerning Soviet strategic defense efforts, is considerably more problematic. [redacted]

**Resumption of construction began at 18 months but was not completely phased in until 48 months.

[redacted]

TABLE 4

CONSTRUCTION STARTS ON SA-5 LAUNCH COMPLEXES, BY YEAR



[redacted]

The pattern of construction starts on SA-5 complexes (Table 4, p. 650) seems consistent with this supposition.

The GALOSH system deployed around Moscow is less ambiguous than the SA-5; its established and undisputed design characteristics clearly fit the qualitative requirements of area defense against ballistic missile attack. The range of opinion about its probable effectiveness receded in immediate significance given its very limited deployment. The Moscow system documented serious and continuing Soviet interest in missile defense, a point that would not have been clear had the SA-5 been the only system involved.

Because of the special uncertainty surrounding Soviet strategic defense, it is difficult to establish a compelling relationship (or lack of it) between decisions on defensive deployments and offensive deployments. There is, nonetheless, some pertinent evidence. First, the GRIFFON system for which the Soviets themselves claimed a dual air defense and missile defense capability, terminated in 1963 after the intercept tests in 1961 and 1962, and SA-5 deployment began at the same time. SA-5 deployment began, moreover, at the old GRIFFON sites. Second, during the same period construction began on the principal ABM radar installations; the Dog House radar (two faces) at Naro Fominsk outside of Moscow was started in 1962; Hen House installations at Olenegorsk, Skrunda, Mishelevka, and Sary Shagan (12 faces in all) were started during the summer of 1963. Third, support activity for sites on the "E" ring around Moscow, which were to become the deployment sites for the GALOSH system, was detected in 1962 and 1963. These data seem to place the ABM deployment decision in 1962-63 when major reprogramming decisions were being made for the offensive forces. The

most natural supposition is that the ABM decision took place in 1963, at the same time as the extensive reprogramming of the offensive forces which occurred during the first part of that year.

Two major adjustments to the ABM deployment program appeared on a schedule readily related to the 1965 decision process: (1) A surge in new site construction for the SA-5 beginning in 1966 (see Table 4, p.650); (2) a sharp cut in the GALOSH deployment around Moscow. Of the 8 complexes under construction in the "E" ring around Moscow in 1965, 4 were abandoned during 1965-67. Launcher sites were under construction at 2 of these abandoned complexes.*

Finally, the 8 single group SA-5 sites--the most plausible configuration for an air defense mission--all were started after 1970 and could have been decided upon as part of the force adjustment included in the 1971-75 5-year plan.

* * *

These general observations about the Soviet program present an interesting problem for more detailed interpretative analysis. The apparent decision points in 1958, 1965, and 1970 occur at logical times, given the evidence now available on the Soviet planning cycle. This is not so, however, for the decisions of 1962 and 1971, when there were major disruptions in the deployment program, or for the decisions

*Three of these abandoned sites were reprogrammed for other purposes after 1971.

of 1963 when there were major additions to the program.* During 1959-65 a 7-year economic plan was in effect which had been formulated in 1957-58. Though there is no direct evidence to this effect, there is a distinct possibility that a 7-year defense plan accompanied the economic plan; if so, reprogramming decisions of the magnitude of 1962 and particularly 1963 occurred at an unusual time off of the "normal" schedule. This irregularity could be swept away either by denying a stable defense planning cycle for those years or by assuming that the general turbulence caused by Khrushchev's various economic initiatives forced reprogramming at those times for reasons unrelated to strategic calculations. Despite this uncertainty, there is still a serious possibility that the reprogramming did relate to strategic calculations made during those years and that it does offer clues about formative experiences influencing the Soviet force posture. The nature of the decisions that might have caused off-cycle force reprogramming of the sort observed is a principal point of difference between alternative interpretations of the Soviet program. The off-cycle decisions in 1971 seem quite clearly related, at least in part, to the SALT agreement and can be considered in that context.

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*The decisions reflected in the 1968 force adjustments were also off of the normal planning cycle as hypothesized, but these did not involve either a halt in incompleted construction or major force additions at strategic range as that is usually defined. The adjustments observed in 1968 could plausibly be undertaken without any major shift in an established allocation of resources, and they raise a separate question.

The Argument for Coherence and Self-Initiated Intentions

It has long been the most natural supposition of American analysts that the Soviet military effort in general and the strategic program in particular have been organized to pursue a coherent set of objectives. This proposition emerges from the mainstream of interpretive logic, and there is a powerful tendency for any distant observer without access to details of the actual decision process to adopt such a perspective. The resulting analysis proceeds by interpreting the strategic intentions implicit in the observed pattern of Soviet force deployments and by estimating the degree to which the implicit purposes have been achieved. Analysis of this sort is strongest and achieves the widest acceptance when a plausible set of objectives can be found which are reasonably matched by observed military capabilities. The timing of decisions is less important in this view than the observed outcomes.

This was the logical view of the Soviet program suggested by McNamara during the latter years of his tenure as Secretary of Defense, and his analysis did accord with a number of fundamental facts about the emerging Soviet deployment. The SS-9 missile, whose single-shot kill probability against a hardened silo appeared to be respectable,* was not being procured in sufficient numbers to attack each hardened MINUTEMAN installation planned for the U.S. force.[7] The SS-11 missile, which was being procured in much larger numbers, did not have a

[redacted]

sufficient single-shot kill probability to represent a serious threat to the fixed-site silos.[8] The Soviet ABM system could be saturated by the advanced MINUTEMAN RVs then in prospect and could be bypassed by the POLARIS/POSEIDON force. The Soviets were not pursuing serious, operationally deployed antisubmarine warfare capabilities, at least not by the acoustical methods that the United States found to be most promising. The extensive Soviet air defense forces still allowed very reliable low-altitude penetration by the U.S. bomber force. All this could be interpreted to signal an intention to eschew a serious damage limiting capability and to hold with an assured destruction objective which the United States conceded it could not deny the Soviets--in effect a limited, basic deterrence position.

This interpretation also proved to be consistent with the central technical characteristics of the third and fourth generation Soviet missile deployments--the hardening and dispersal of the land-based installations and the submerged mobility for the SS-N-6 and the SS-N-8 SLBMs in the Yankee-and Delta-class submarines. The silo configurations for the successive Soviet missile systems, summarized in Table 6 (p.657) seemed rather clearly to reflect a desire to provide the protected second-strike capability that is the primary requirement of the assured destruction mission. The SS-9 and SS-11 designs dispersed the deployed missiles to isolated sites, thereby precluding an attack on more than one silo by a single warhead. The SS-17,-18, and-19 silo designs provided dramatic increases in hardness--that is, resistance to the blast effects of attacking warheads. In addition, the hardening of communication facilities, [redacted] and the

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construction of redundant communication channels [redacted] provided direct supporting evidence of Soviet concern for a survivable force, and again this activity was exactly what would be expected of a force structure designed for the assured destruction objective.

The priority given to the Soviet SLBM program was even stronger evidence in the same direction. The mobile submarines, given the technology of the era, provided the least vulnerable deterrent force, but they did so at a cost to overall system accuracy--the most critical variable affecting counterforce capability. The development of the Yankee submarine and the gradual introduction, after 1970, of continuous Yankee-class patrols within nominal missile range* of U.S. targets were both clear signs to proponents of McNamara's suggestion that Soviet force planning took into account the logic of assured destruction. Moreover, subsequent deployment of a longer range SLBM--the SS-N-8--in an only slightly modified submarine (the Delta class) further strengthened the case. The increase in the SS-N-8 range decreased accuracy, but it also reduced submarine vulnerability, since increases in range geometrically increase the ocean area from which the submarine can strike at its targets. The Soviets

[redacted]

introduced a stellar inertial guidance system into the SS-N-8 which offset the accuracy reduction caused by the increase in range, and this resulted in an overall system accuracy roughly equal to the SS-N-6. With CEPs of more than .5 n. miles and yields of 1-1.5 MT, neither system posed a serious threat to hard targets.[9] Again, the assured destruction objective seemed to be served by the design choice which the Soviet program reflected.

Finally, the vigorous attention given to land mobile missile deployments--at least in the SS-13 program*--was further serious evidence of Soviet design objectives even though the SS-13 has not been extensively deployed.

Despite this array of evidence, however, the scale of the Soviet missile deployments, particularly the increment programmed in 1965, served to undermine assured destruction as a Soviet objective in the minds of American analysts. Already in 1965 it was apparent that the Soviets had procured medium-range systems well in excess of what could readily be explained by a desire to achieve basic deterrence. The 1,500 Badgers and 750 SS-4s and SS-5s which had been produced greatly exceeded what an assured destruction threat against Europe seemed to require, giving the obvious implication that the Soviets intended to attack allied military forces in the European theater in the event of war. Ample

*There is incomplete evidence that the SS-8 and the SS-10 were also originally designed as rail mobile deployments.

evidence for this proposition could be found in Marshal Sokolovsky's presentation of Soviet strategy as well as in the general observation that such an intention accorded with the traditions of the Red Army, particularly its World War II experience. As the SS-11 program drove Soviet ICBM deployments well beyond the force projections associated with the limited deterrence argument, there was a strong tendency to extend the counterforce interpretation to the strategic forces as well.

It is unlikely that the scale of the Soviet program would have outweighed the other evidence if that was all that determined U.S. analysis, but more fundamental beliefs were also involved. The analysis which attributed a limited assured destruction objective to the Soviet strategic program, for all its appeal in the context of 1965, did not mesh well with the much more diffuse but also more deeply seated image of the Soviet Union as an aggressive, revolutionary power. That latter image had taken hold strongly in the United States during the 2 decades after World War II. The experience with a Soviet Union apparently anxious to project its power and willing to risk war in Eastern Europe, Korea, Indochina, and the Middle East made it plausible to American analysts that the underlying Soviet objectives would be more demanding than basic deterrence and would include the ability to wage nuclear war in support of central political objectives. When the scale of Soviet programs provided direct evidence in support of these underlying suspicions, it became widely believed that the Soviets were seeking a serious counterforce capability--i.e., a strategic force larger and more effective than that which would result from normal

hedging against worst case destruction by a U.S. first strike.*

This proposition became the dominant presumption in the United States when Soviet R&D testing in 1972-73 revealed the technical characteristics of the SS-18 and SS-19 missiles. In addition to the sharp increase in the hardening of their silos, both of these systems displayed substantial increases in payload, a capability for putting separate warheads into separate trajectories, and design features clearly intended to increase accuracy. These technical developments affected the critical terms of the standard equations for calculating the probability of damage to MINUTEMAN silos, and this was taken as strong indication of Soviet intentions to develop the counterforce capability which had not been apparent in their SS-9 and SS-11 deployments. The payload increases, taken together with estimates of their warhead design capabilities, meant that each of the new missiles could carry 6 or 8 warheads with yields in the megaton range. Though

*The state of opinion on this subject among those whose opinions importantly affect the actions of the U.S. Government is, of course, very difficult to document. The clearest test of the assertion made here occurred when the SALT I agreement was submitted to the U.S. Senate for ratification. Opponents of the treaty attracted a great deal of political support by attacking the numerical advantage in launcher numbers and silo size conceded to the Soviets in the interim agreement on offensive forces. The small numerical disparities were not significant in terms of real military capability, but the Senate debate and the subsequent discussion of the Soviet program in the Defense posture statement recorded the fear that the disparities were not marginal errors in a mutual search for parity--as the treaty formally proclaimed--but rather early signs of a Soviet attempt to gain significant strategic advantage.

projected accuracies for these systems were very uncertain and observable guidance technology did not appear to match standards achieved for the advanced U.S. systems, accuracy values of 0.2 nautical miles and better appeared to be possible, and this was sufficient to raise the spectre of MINUTEMAN vulnerability.

Taken together, these developments presented a clear paradox. The political character of the Soviet Union as understood in the United States, the scale of emerging Soviet strategic programs, and some of the technical improvements incorporated in the fourth generation missiles implied by established rules of interpretation that the Soviets were preparing for systematic counterforce operations and that some appropriate intention must be present--to limit damage in case of war, to achieve outright military victory, to exercise political leverage based on military superiority, or to pursue some combination of all these purposes. The technical character of the force structure, however, continued to have the weaknesses enumerated above which would seriously compromise any of these objectives. Real ABM, air defense, and ASW capabilities remained very low, and even the technical changes in the direction required to attack hardened and dispersed targets remained well short of levels which U.S. analysis would recognize as clearly decisive. With all its dimensions taken into account, the Soviet program was not consistent with a single-minded, effective pursuit of militarily useful

or politically impressive strategic advantage.*

It is possible to resolve the apparent paradox by accepting the strong and highly speculative assumption that the Soviet force structure was designed to achieve victory in nuclear war through attack on the command and control structure of the U.S. strategic forces. As detailed in previous chapters, there is some reason to suppose that such an attack might be successful, and there is circumstantial evidence suggesting such a purpose in actual Soviet force deployments. The size of the SS-9 force meets the requirement for an attack on launch control facilities and other command and control installations. The SS-9 silos, moreover, are oriented in such a way as to suggest targeting against MINUTEMAN and TITAN installations exclusively, with prominent urban concentrations such as New York, Chicago, Pittsburgh, and Boston not targeted at all by this force. The submarine force, because it can elude the surveillance systems which would provide warning of an attack that has been launched, is particularly useful for attacking central command and communication facilities. The Soviets have also tested anti-satellite systems and have apparently deployed them. The extensive

*Since the inception of the study, concern has developed over the Soviet civil defense program as an integral element of the Soviet strategic posture, and a relatively high level of activity in this area--as measured in terms of manpower and imputed budgets--has been advanced as further evidence that the Soviets are attempting to achieve a systematic capability to wage nuclear war. The original terms of reference of the current study did not include civil defense, hence a full historical review of the topic was not undertaken. In analyzing the Soviet program after 1965, however, we did review available evidence on the civil defense effort and found it to be consistent with the statement made here. There has been significant activity relating to civil defense but it does not provide a militarily impressive capability. Most (80 percent) of the Soviet industrial structure remains exposed to destruction by a modest percentage of the U.S. strategic forces.

hardening and dispersal of their own command and communication facilities suggests that serious attention has been given to this dimension of the problem. If this is the basic purpose of the Soviet force, then the absence or weakness of the principal components of the damage limiting package as defined by U.S. analysts is not pertinent. It matters less that U.S. bombers and missile warheads could penetrate, that U.S. submarines are not being aggressively pursued, and that land-based missile silos cannot be completely destroyed, if primary reliance is being placed on the proposition that a sudden attack on the U.S. command structure would indirectly incapacitate these force elements.

One can seek to bolster this proposition by more intricate arguments which weave together some puzzling observations of the Soviet program with bold technical speculation. It has been suggested, for example, that the force reprogramming decisions in 1962* were inspired by a shift in overall design objective to focus attack on the U.S. command and control structure. These decisions followed the 1961-62 high-altitude weapon test series during which it is now believed the Soviets may have observed the electromagnetic pulse (EMP) effects of such explosions and may have derived from the observations a theory of attack on command and control systems, including missile guidance systems. This would help account for the otherwise very puzzling coincidence of sharp cutbacks in the overall ICBM program and the very aggressive Cuban deployment. The missiles in Cuba would not have increased the overall Soviet missile force nor made more missiles available sooner as compared with the option of completing the sites in the Soviet Union where

*See above, pp. 485-86.

construction was halted during the summer and fall of 1962.

The missiles in Cuba, however, would have allowed attacks against critical targets in the U.S. military command system with very little warning, and in that role they would have provided a much more impressive increment to Soviet capabilities. Table 7 (p.666) shows the target requirements that U.S. forces of the period posed to Soviet planners using the conventional assumption that missile locations and SAC bases were the preferred counterforce targets. The Cuban deployment was not of sufficient size to meet these requirements. Table 8 (p.667) shows the targeting requirements against U.S. forces of the period if the military command structure were the primary focus of attack and EMP calculations enter into the attack design. The Cuban missile deployment matches the requirement under this assumption.

It is possible, moreover, that the puzzling technical adjustments to the SS-7 program were designed to produce EMP effects as a central part of the attack on the command and control network. The shift in RV design for the SS-7, introduced in the fall of 1962, significantly reduced system accuracy while allowing for increases in yield. This is not a desirable tradeoff if the purpose is to maximize blast effects against hardened installations, but it might be if high-altitude explosions for widespread EMP propagation were being contemplated as a supplement to SS-9 attacks on hardened structures with standard blast effects.

Despite the clarity which the command and control targeting proposition apparently brings to the overall Soviet force structure,

TABLE 7

TOP SECRET

U.S. STRATEGIC FORCES
Number of Launchers and Aiming Points
(Conventional Calculation)

	1 Jul 1962		1 Oct 1962		1 Nov 1962		1 Jan 1963		1 Jul 1963		1 Jan 1964	
	L	AP	L	AP	L	AP	L	AP	L	AP	L	AP
ATLAS D	24	8	24	8	24	8	24	8	24	8	24	8
ATLAS E	27	27	27	27	27	27	27	27	27	27	27	27
ATLAS F	0	0	24	24	36	36	72	72	72	72	72	72
TOTAL	51	35	75	59	87	71	123	107	123	107	123	107
TITAN I	18	6	54	18	54	18	54	18	54	18	54	18
TITAN II	0	0	0	0	0	0	0	0	0	0	54	54
MINUTEMAN	0	0	0	0	0	0	10	10	160	160	310	310
TOTAL MISSILES	69	41	129	77	141	89	187	135	337	285	541	489
US SAC Air Bases*	45-55		45-55		45-55		45-55		45-55		45-55	
THOR (RAF)	60	20	60	20	60	20	60	20	30	10	0	0
JUPITER (IT)	30	10	30	10	30	10	30	10	0	0	0	0
(TUR)	15	5	15	5	15	5	15	5	0	0	0	0

L = Launcher
AP = Aiming point per launcher or group of launchers
* = Number can vary depending on whether bombers, tankers, and Recce A/C bases are included. Dispersal bases not included

Compiled by author.

[redacted]

TABLE 8

U.S. ICBM FORCE
Number of Launchers and Aiming Points
(Assumes EMP effects play a major role in USSR calculations)

	1 Jul 1962		1 Oct 1962		1 Nov 1962		1 Jan 1963		Jul 1963		Jan 1964	
	L	AP	L	AP	L	AP	L	AP	L	AP	L	AP
ATLAS D	24	8	24	8	24	8	24	8	24	8	24	8
ATLAS E	27	3	27	3	27	3	27	3	27	3	27	3
ATLAS F	0	0	24	2	36	4	72	6	72	6	72	6
TOTAL	51	11	75	13	87	15	123	17	123	17	123	17
TITAN I	18	6	54	18	54	18	54	18	54	18	54	18
TITAN II	0	0	0	0	0	0	0	0	0	0	54	6
MINUTEMAN	0	0	0	0	0	0	1	1	160	16	310	31
TOTAL MISSILES	69	17	129	31	141	33	178	36	337	51	541	72

L = Launcher

AP = Aiming point per launch control facility (LCF)

	L per LCF
ATLAS D	3
E	9
F	12
TITAN I	3
II	9
MINUTEMAN	10

[redacted]

Compiled by author.

however, and despite the fragmentary evidence which can be marshalled in support, the thesis that from 1962 on the Soviets systematically planned their forces to produce a counterforce capability based on destruction of the U.S. command system is too strong to be credible in the absence of compelling evidence. An attack plan of this sort would force such large uncertainties that the coherent and rational Soviet planning process assumed by the above interactive approach would be most unlikely to meet the massive and unhedged commitment implied by this analysis.

While there is ample evidence to suggest that Soviet military leaders, if propelled into war, might attempt counterforce attacks with heavy emphasis on the U.S. command structure, there is not a compelling case that the entire strategic force has been fully postured to achieve that strategic purpose, or any other that can be adduced. As a practical matter, the actual capabilities displayed by the Soviet forces do not consistently fit any overall strategic design, a clear indication that the evolution of those forces has been complexly determined. In view of the complicated evolution of the American strategic forces, this result is hardly surprising. It does lead, however, in the direction of difficult adjustments in American conceptions. Despite the enormous uncertainties involved and despite well-established analytic habits, understanding of the Soviet strategic program in historical perspective seems to require some disaggregation of the decision process, and more insight into political and organizational complexities and human limits.

The Argument for Partial Program Integration and Political Reaction

If analysis of the Soviet strategic program begins with the assumption that the decision process is indeed not fully integrated or comprehensively rational, then a very different structure of inference can be woven around the available evidence and a different assessment of the Soviet threat emerges. The great difficulty here has been not that the basic proposition is implausible--quite the contrary--but rather that it seems to open up such a wide range of possible interpretations that choice among them threatens to become undisciplined and arbitrary. The clarity of argument which the assumption of a coherent Soviet program permits, together with the inherent tendency to hedge against what appears to be the worst case, has inhibited development of a more disaggregated analysis of Soviet strategic development involving uncertainty, competing political values, organizational inflexibility, and the natural tendency to pursue partial objectives. After nearly two decades of observation, however, the absence of a compelling rationale which encompasses all of the Soviet strategic activities demands a serious attempt to develop an account in which imperfections in the decision process are treated not as marginal and transient errors but rather as fundamental and continuing conditions expected to have important effects on strategic capability.

Though the organizational structure of the Soviet defense establishment is known in broad outline,* direct information is not sufficient

*For detailed discussion, see (TS) Karl L. Spielmann, Jr., "The Evolution of Soviet Strategic Command and Control and Warning," IDA, Study S-469, May 1975.

to establish details of the organizational and political processes by means of which the Soviet strategic forces have been designed, produced, deployed, and operated. If one begins with the expectation, however, that the organizational processes are likely to have been important determinants of the overall strategic posture, it is possible to infer something about them from the observed pattern of behavior; and, one can take care that the inferences are not contradicted by what is directly known.

The most important general proposition which emerges from this approach is that development of the Soviet strategic forces has been affected by underlying organizational distinctions between three functions: (1) Research and development of weapon systems and component technology; (2) the production and deployment of these systems; and (3) their strategic direction and operational command.* The pattern of activity in each of these areas varies sufficiently over many years of observation to sustain the thesis that underlying organizational processes brought somewhat different factors to bear in each area and created separate channels for making decisions. It is possible, even likely,

*The observation of well-integrated high-level management of the Soviet defense effort obviously does not support this assertion, but neither does it directly contradict it. The organizational processes posited would operate under the Defense Council. Recent evidence regarding scientific institutes and missile design bureaus provides some direct support. It has been observed, for example, that a given rocket engine is tested 3 times in separate locations representing organizationally distinct stages of basic development, integration into a weapon system, and serial production. There is also pertinent evidence from the diplomatic record which has not been available in intelligence channels. In a conversation with Secretary McNamara, for example, on 11 April 1967, Soviet Ambassador Dobrynin emphasized that the Soviet "Defense Minister and military leaders are not members of the group which makes political decisions in the Soviet Union and that they have little influence on decisions affecting such matters as the level of strategic offensive and defensive forces." See Memorandum of Conversation, Secretary of Defense McNamara and Soviet Ambassador Dobrynin, 11 April 1967.

that staff work for decisions in these separate areas is done by different people. The clearest case concerns research and development for weapon systems and their technical components. The known organizational structure of design bureaus and test centers and the stable and consistent R&D activity across the full range of pertinent military technology make it apparent that a vigorous R&D program has been organized as a high priority element of the overall strategic effort and that the organizational units involved are relatively unaffected by budget constraints, changes in the political leadership, changes in the international atmosphere, or changes in the missions of the separate Services. A full-scale R&D program covering all the main dimensions of modern military technology appears to be an undisputed and thoroughly established objective in the Soviet system.

The procurement cycle is very tightly integrated with the R&D process as manifested in concurrent scheduling of R&D testing and silo prototype construction for the ICBM systems, and in the sharing of test facilities for these purposes. It is apparent, however, that a reasonably sharp distinction is made between R&D and procurement. A number of weapon systems went through an extensive and normally scheduled development process but then experienced very different fates at the procurement stage. The SS-6 program went into large-scale production but was diverted to the space program after only four ICBM sites had been constructed. The SS-8 deployment program was sharply cut back after dedicated complexes and launcher sites had been constructed. The SS-10, to all appearances a technical success, was never deployed. The SS-13,

developed in fixed and mobile versions, has been deployed only in fixed sites in very limited numbers. The deployment of the GALOSH system around Moscow was reduced by half in 1965 while its initial construction was in progress, even as full-scale R&D activities at Sary Shagan apparently continued. In general, intensive development of strategic systems in the Soviet Union has not led nearly as reliably to actual deployment on a serious scale as it has in the United States. The organizational mechanisms for separate consideration of the deployment question are not known, but the existence of such mechanisms can be inferred.

It also seems likely that a different set of organizational arrangements exists to manage the operational forces and that somewhat different considerations influence decisions made in this sphere. The major clue is the development of readiness rates and reaction times of the Soviet strategic forces. Despite considerable doctrinal emphasis given to preemption in strategic writings, despite the great concern for invulnerability displayed in the physical protection given their deployed ICBM forces and command structure, and despite the high readiness and quick reaction times achieved by some elements of the Red Army in Europe, the Soviets have been very cautious about readiness and reaction time in the strategic forces. The components whose readiness is more observable--bombers, submarines, and soft missile launchers*--have been maintained at much

*The silo-based ICBMs are inherently more ready than the soft site missiles since they do not need to be moved to erectors for launching. Thus there was an increase in readiness of the Soviet missile force as a concomitant of giving it greater physical protection. Since the covered silos also preclude more detailed observations which might give some estimate of the usual state of the missiles they contain, it has not been (cont'd)

lower readiness states than U.S. forces. The bombers have not been maintained at a level of alert which would enable them to conduct offensive operations on anything remotely approaching the 15 minutes notice to which the U.S. bomber force aspires, approximately the tactical warning time either side would expect under conditions of a surprise attack. Even during the Cuban crisis in 1962 and the Middle East crisis in 1967, when U.S. forces which might threaten them were on high alert, the Soviet bomber force maintained its low readiness posture. Similarly, at the soft missile launcher sites the missiles have rarely appeared on their launchers, and 80-90 percent of the Yankee-class submarines have been in port at any given time--even during crises. As discussed below, there was a steady increase in readiness over the very low level characteristic of the early Soviet strategic deployments, but even with those increases overall readiness remained decidedly moderate compared with other dimensions of the Soviet strategic effort. At least some of the major changes, moreover, seemed to have been precipitated by the 1967 Middle East crisis* and occurred well off of the cycle for major force programming decisions.

(Cont'd) possible to distinguish degrees of readiness for the bulk of the ICBM force. A high state of readiness is generally attributed to it by U.S. analysts, but that is done as a deliberately conservative assumption for the purposes of threat assessment --i.e., it is done on the basis of technical possibility rather than direct observation. The primary constraint on missile reaction time derived from the gyros in the guidance system, and for technology of the period it required 20-25 minutes to bring gyros from a dead stop to fully stabilized motion. There was indication that the Soviets had provided the SS-11 force with a rapid spin-up capability permitting firing within a few minutes even if guidance system gyros had not been previously running (though with some decrease in system accuracy). This capability apparently did not extend to the SS-9.

*There is some evidence of Soviet dissatisfaction with the readiness of their forces during the war in the Middle East in June of 1967.

Obviously, if the Soviet Union did indeed factor the strategic problem into separate components of force design, force deployment, and force operations, the apparent imbalances of Soviet force posture are not surprising--e.g., imbalances between technical design and force size or between physical protection (hardening and dispersal of land-based installations) and a very-low-level alert posture. Indeed, such imbalances offer critical evidence of the existence and importance of the separate organizational processes.

A second basic proposition of the alternative analytic approach holds that the objectives normally conceptualized in American analysis of strategic issues--i.e., assured destruction to guarantee basic deterrence or counterforce capability to limit damage, achieve military victory, or support political objectives--are far too general to explain Soviet decisions made even in the restricted organizational channels hypothesized. Though it could be argued that the extensive effort made to disperse and harden the Soviet strategic forces indicates that the assured destruction objective has dominated their force design decisions, it seems far more likely that the operational objectives are themselves much more restricted. In the experience of the United States, most weapon systems have been designed and developed to achieve specific technical performance standards advanced more on the basis of technical feasibility than calculations about the probable outcome of war or political confrontation. By extension, though Soviet decision-makers at all levels undoubtedly appreciate the desirability of having invulnerable strategic forces, hardening and dispersal was probably undertaken, as Khrushchev testifies,[10] because it suddenly became possible and because it provided concealment

and protection against weather. Once such a specific design objective became established, the pertinent organizational channels could be expected to work to increase performance but not necessarily to undertake a systematic approach to the more general, abstractly defined problem. Hence, hardening can be very aggressively pursued while other dimensions of strategic force protection--warning time, alert rates, and response time--receive very different treatment.

Within this framework of logic, then, a number of interpretive generalizations can be advanced to explain the central characteristics of the Soviet force posture as third and fourth generation weapons were deployed.

Force Size as a Political Reaction

Under this conception of the Soviet decision process, it is a reasonable expectation that major procurement decisions which determine the size of strategic force deployments would be subject to broad political influences and that, as occurred in the United States, a coherent calculus relating force size to clear strategic objectives would tend to follow rather than precede the pertinent decisions. In retrospect, this does appear to have happened in the Soviet Union. The pace and scale of Soviet ICBM and SLBM deployments do appear to have been driven by political reactions to the U.S. strategic program in the context of the major confrontations between the two powers in the early 1960s. It is a reasonable inference from evidence that Khrushchev made a major internal political commitment in 1958 in effecting a substantial cut in a previous plan for ICBM deployment. The 7-year plan promulgated

in 1958 clearly made provision for a substantial deployment of medium-and intermediate-range (SS-4s and SS-5s) missiles to the European and Far East theaters, but despite some strong technical similarities in the systems involved (the SS-5 and SS-7), ICBM deployment was severely restricted and delayed. This political position was undermined by the U-2 incident in 1960, the Berlin crisis in 1961, and the Cuban crisis in 1962. Khrushchev was forced into a series of ad hoc adjustments to the intercontinental-range forces--off of the normal planning cycle. In the next formal plan, formulated and adopted in 1965, Khrushchev's successors programmed a strategic force apparently designed to match U.S. strategic deployments in overall force size and basic technical composition. By 1965, these questions appear to have been decided at the authoritative political level, though technical implementation was just beginning.

This political posture attributed to Khrushchev accounts in a straightforward way for the otherwise puzzling delay in ICBM deployment at a time when Soviet booster technology (specifically the SS-6) was being successfully demonstrated in the space program, when a major commitment to missile systems was being made in the extensive SS-4 and SS-5 deployments, and when the U.S. was undertaking crash efforts on behalf of the early ATLAS, TITAN, POLARIS, and MINUTEMAN programs. The argument also accounts for the gross disparity between the scale of deployment and its technical characteristics, since the assertion is that the Soviets simply deployed what was available at those points at which crisis events produced political shifts among the leadership.

The analysis can be pursued, however, beyond such arguments of general plausibility. It is possible to relate the observations of major changes in strategic deployment activities enumerated above to significant political events--notably meetings of the Communist Party Presidium, plenary sessions of the Central Committee, and Party Congresses which brought about publicly apparent changes in policy and changes in the status of major political figures. The correlation between these different sets of events is close enough over an extended period of time to imply clearly that the political fortunes of Khrushchev and other major figures in the leadership were deeply affected by their position on strategic deployment questions, and that the U-2 incident, the Berlin crisis in 1961, and the Cuban missile crisis all had strong effects on the developing Soviet force posture. Some details of these events, which were not much more than isolated facts at the time, assume far greater significance in light of the actual evolution of Soviet forces in the late 1960s and early 1970s.

Khrushchev established his basic political position in working out the 7-year plan in 1958 and in adjusting the strategic deployment program undertaken in 1962. At both points some very sharp decisions were made. The cessation in 1958 of early construction activities at a number of sites presumably associated with the missile program indicates that the 7-year plan formalized a reduction in the number of ICBM installations previously anticipated by the defense industry. During 1960 and 1961 construction started at an additional set of sites, only to be stopped again by the decisions of 1962. If one assumes that the first ICBM complex started, the 25-launch site complex at Yurya for the SS-7, was

indicative of the current plan, then the original deployment program before the cuts in 1962 must have been on the order of 600-700 missiles.* If the evidence from construction activities is fully credited, Khrushchev cut this program nearly in half by mid-1962--obviously a major political commitment.

The available evidence will not sustain detailed reconstruction of domestic political calculations which Khrushchev might have made, but it is worth noting that the deployment pattern which he apparently intended to bring about implies a plausible strategic policy. If, as Adam Ulam argues, West Germany and China were seen as the most serious, long-term political/military threat to the Soviet Union, then dominance in the European and Far Eastern theaters was the primary strategic requirement.[11] The extensive deployment of SS-4s and SS-5s in the 7-year plan, together with the larger medium-range bomber program previously established, would provide some approximation of military superiority in these peripheral theaters. Simultaneous restraint in building intercontinental-range forces would be consistent with a long-term desire to see the more distant, politically less threatening, but militarily and economically more powerful United States gradually disengaged. This latter logic would

*Including all of the sites for which there is some evidence of association with the SS-6, SS-7, and SS-8 programs, there would have been [redacted] complexes without the cutbacks. At 25 missiles per site this would yield a program of [redacted] ICBMs planned by mid-1962, proceeding at a construction rate which would have provided an operational force of this size within a 2-to 3-year period. The 1958 decisions reallocated the SS-6 to the space program which sustained a large production run. The 1962 decision cancelled the SS-8 program entirely, including, as far as can be judged, production beyond that required for the limited deployment allowed to proceed to completion. The SS-7 program was expanded in increments during the 1960-62 period and finally curtailed in late 1963.

be encouraged by the serious question of resource constraints. Most recent estimates of Soviet military budgets of the period indicate that they were roughly double what U.S. analysts then estimated them to be; moreover, the Soviet military sector was not (as then supposed in the United States) substantially more efficient than the civilian sector.* Khrushchev's strong political commitment at the inception of the 7-year plan to increased agricultural production provided a strong incentive to adopt a strategic policy focused primarily on the peripheral theaters and dedicated to strategic restraint and political detente with the United States.

Since Khrushchev's diplomatic behavior, as documented in previous chapters, obviously did not express such sentiment, this analysis must assume the presence of strong political opposition to Khrushchev's defense policy within the Soviet leadership. The coincidence of crisis events, political shifts, and major strategic deployment decisions noted above provides circumstantial evidence that internal opposition did exist, that it was strong enough to force Khrushchev's aggressive behavior in Berlin and Cuba as a defensive reaction, and that the resulting strategic program was the net result of Khrushchev's unsuccessful efforts to preserve his strategic posture against proponents of larger forces directed against the United States.

*Though the strategic programs were probably not large enough to have a major effect on the economy simply by virtue of their total cost, they did require substantial allocations of critical assets--e.g., concrete, chemicals, automotive machinery, and skilled construction workers.

According to some informed accounts, Khrushchev lost political initiative with the U-2 incident,[12] and there is ample reason to accept that view. The U-2 affair threatened the position he was attempting to define--both his force programming commitments and the diplomatic posture he set at the Camp David meeting with Eisenhower in September 1959. Political consequences were immediately drawn. On 4 May 1960--3 days after the U-2 was brought down--a number of important personnel changes were effected at a plenary session of the Communist Party Central Committee.* F.R. Kozlov was brought into the Party Secretariat, A.I. Kirichenko (a major Khrushchev ally) was demoted, and L.I. Brezhnev (then a Khrushchev protege) was eased out in a two-stage process.[13] Two deputies of D. Ustinov (then head of the armaments industry)--V.N. Novikov and K.M. Gerasimov--were made respectively Chairman of the USSR Gosplan and Chairman of the RSFSR Gosplan--critical positions in the state planning apparatus.

Kozlov (who at least subsequently had political ties with Ustinov) quickly moved to challenge Khrushchev's authority within the Party Secretariat, and Gosplan frustrated Khrushchev's attempts to reallocate investment from heavy industry to agricultural machinery. During late

*It is interesting and probably significant that Khrushchev in the early days of the U-2 crisis gave it rather modest import and quickly suggested that President Eisenhower could not have known of the flight. He did not make a strong statement on the issue until after both Allen Dulles and Eisenhower had publicly stated their personal responsibility. Though conventional accounts attribute Khrushchev's early position to tactical maneuvering to trap the Americans into making dramatically refutable explanations, it is also quite possible--and under this line of reasoning very plausible--that Khrushchev was offering a formula for quiet resolution or at least containment of the affair. If so, Eisenhower's public statement eliminated that possibility.

1960 and early 1961 a substantial increment was added to the ICBM deployment plan. Moreover, during May and June 1960 Anastas Mikoyan, the Presidium member most closely associated with Khrushchev in the Camp David meeting and in the spirit of detente which surrounded it, disappeared from activities of the Party leadership in an exercise of political retribution which struck indirectly at Khrushchev himself.

If the U-2 affair was an embarrassment which gave both legitimacy and political position to opponents of Khrushchev's defense posture, the Berlin crisis in 1961 was a major defeat with observable consequences in the strategic program. Khrushchev had to retreat from his virtual ultimatum and his intemperately proclaimed public commitment in the face of a newly clarified strategic situation--the United States enjoyed an obvious and increasing advantage in intercontinental-range strategic forces, an advantage to which the Kennedy administration was apparently willing to appeal over Berlin.* By a coincidence of timing, moreover, the retreat had to come in a particularly difficult internal political context--the 22nd Party Congress in the fall of 1961--which brought

*As noted in Chapter XI, the Kennedy administration did undertake discussions in 1961 of a special plan--separate from SIOP 62--for using nuclear weapons against the Soviet Union in response to military action in Berlin and did get far enough to identify conceptually an attack plan considered plausible. This, and the development of an accurate intelligence assessment over the summer of 1961--showing a substantial United States advantage--created the conditions for serious political use of a strategic threat. The communication of such a threat to the Soviet Union was done with diplomatic delicacy and does not appear to have been formulated by Kennedy in anything more than very general terms. Accepting that there were inadvertent means of communication and that both because of his own political situation and because of the strategic position of the Soviet Union Khrushchev appears to have been extraordinarily sensitive, it is quite likely that a stark threat was perceived in Moscow. In retrospect, one can identify a number of ways in which such a threat was communicated. (cont'd)

1) On 25 July 1961 Kennedy gave a speech on the Berlin crisis in which he invoked the strategic strength of the United States directly and stated a strong political rationale for using it should the situation require it. In relating the most fundamental political principles to the Berlin confrontation and urging grim resolve on the American people--even to the point of dwelling at some length on the necessity of constructing fallout shelters--Kennedy was clearly warning that the crisis could develop into full strategic nuclear confrontation. In September, Georgi Bolshikov, editor of the magazine USSR, and Mikhail Khalarmov, chief of the Soviet press office, told Pierre Salinger, Kennedy's press secretary, that Krushchev was under great pressure to settle the Berlin question and that the 25 July speech, understood as an ultimatum, had greatly upset him. (Memorandum to the President by Pierre Salinger 24 Sep 61.)

2) Through agents who had access to deliberations of the Berlin task force, the Soviets learned that the allies were planning to send an armed column down the Autobohn in the event of obstructions on the Berlin access routes and that they would be instructed to fight if opposed even though the task force knew the columns would be defeated. The clear implication of this inadvertent message was that larger forces would then have been evoked--i.e., deliberate escalation.

3) In September 1961 Khrushchev took the initiative to set up a special channel of communications to discuss the Berlin situation without informing the respective foreign offices. (Special arrangements for communications between the Heads of State had also been used in April on the occasion of the Bay of Pigs crisis but had to be reactivated for Berlin). After attempting without satisfaction to use C.L. Sulzberger for such purposes, Khrushchev on 29 September 1961 wrote Kennedy a long personal letter from his vacation villa on the Black Sea urging a settlement of the crisis via the medium of these personal letters. Kennedy's reply was not sent until 16 October 1961--when the President was also at his vacation home on Cape Cod. As a result of the delay, Kennedy's letter reached Khrushchev apparently on the day before the 22nd Party Congress opened. It was moderate in tone but contained some phrases that would have been highly provocative to his politically pressured reader: "It is not the remains of World War II (apparently referring to Khrushchev's main justification for a Peace Treaty) but rather the threat of World War III that concerns us all." "The alternatives /to a settlement/ are so dire..." Given the delay, the timing of its arrival, the phrases it contained, and the fact that it used the special channel to state an uncompromising political position, Kennedy's letter may well have been interpreted as confirmation that the basic U.S. position was to hold firm against accommodation in Berlin on the basis of strategic superiority. Khrushchev's reply on 9 November 1961 hints that such was the case. It was tougher in tone despite the fact that it confirmed his abandonment of the December deadline for agreement, and it contained an interesting phrase: "I have no ground to retreat further. There is a precipice behind." (The letters containing these phrases are from the Pen Pal Exchanges, held at the State Department and the Kennedy Library).

further consolidation of Kozlov's administrative influence and an unfavorable test of strength for Khrushchev before the assembled party cadres.* The consequences became apparent the following spring when the 1962 strategic force reprogramming decisions were made.

On 5 March 1962 at the opening of a special plenary session of the Central Committee on Agriculture, Khrushchev in the name of the Party Presidium outlined a program for increased production of agricultural machinery in service of better agricultural performance--his major political commitment. Four days later at the close of the session he sharply reversed his emphasis and warned:

> The officials in charge of agriculture ... must understand that the measures envisaged for strengthening agriculture do not mean that we shall immediately divert funds away from industry and the reinforcement of the country's defence.[14]

This highly unusual shift in position was followed by a number of signs in April that major adjustments to the defense program were under way--press articles proclaiming the primacy of heavy industry and defense (principles Khrushchev had explicitly amended in promulgating the Seven-Year Plan); announcement of a 20-to-30 percent increase in meat and dairy prices; cancellation of a plan to eliminate the income

*Khrushchev launched a surprising and intense revitalization of his de-Stalinization campaign at the 22nd Party Congress (after conceding most of his Berlin position in his opening speech). The campaign was almost certainly directed at his rivals who quickly contained it, with minimal result (the removal of Stalin from his mausoleum). To the cadres schooled in the subtleties of Party politics it is likely that the affair served as a measure of power and sent a message indicating Khrushchev's diminished authority. By early 1962 there were subtle signs in the Soviet press of Khrushchev's reduced prestige and a resurgence of the military. A number of Kozlov's former associates were promoted within the Party and the economic administration, and one of them, I.A. Grishmanov, became head of Gostsroy, the building industry, replacing a personal friend of Khrushchev's. See Tatu, p.137.

tax (with which Khrushchev had been closely associated); and the replacement of the commander of the Strategic Rocket Forces, K.S. Moskalenko. Though it requires some speculation, it does appear that the sequence of decisions in March and April 1962 involved a major struggle between Khrushchev and his Presidium colleagues over defense policy, and that the puzzling elements of the resulting program came about because neither side could exercise full political authority.

If one assumes that Khrushchev, under sharp political challenge in the spring of 1962, was attempting to reassert his authority and still preserve his basic position on defense policy (the one objective probably requiring the other by that time) then a reasonably consistent pattern can be constructed from the activities which followed. Under the political circumstances, his obvious need would be to provide an immediately credible military response to the U.S. strategic forces stationed outside of the peripheral theaters, but without simply acceding to the large strategic forces deployment plan he had been resisting. It is quite possible that he sought to do this by adopting the strong theory of strategic warfare outlined above, namely, defense against the U.S. strategic forces by preemptive attack directed at the command and control systems. This would not require full matching of the large U.S. program; it could well prevent the worst case--a fully coordinated first-strike by the entire U.S. force structure--and it would give some chance of decisive success, however small, should war be forced on an unwilling Soviet Union as it had been in the past. The Cuban deployment was of the appropriate size to cover SAC bases on the first volley, and of the two targets definitely identified, one was a SAC base. Though there were obvious

and major benefits to the fact that missiles fired from Cuba would give very little warning, it was nonetheless true that U.S. bombers could be dispersed and that the actual operational plan for bomber attack was heavily dependent on staging bases in the peripheral theaters which were already covered by Soviet forces. What could not readily move and was not in the theaters was the SAC command structure. Targeting the command structure would help explain why the Soviets would undertake the very risky Cuban deployment at the same time they were halting construction work on a number of SS-8 sites. If simple numbers of strategic missiles had been the issue, it would have been both faster and safer to finish the ICBM sites already under construction, perhaps on an accelerated schedule.

Command structure targeting derives further substance from the fact that in 1962, in addition to the adjustments in the Soviet missile deployments described previously, a construction program started involving 9 new SS-4 and SS-5 sites which had a number of peculiar features. The sites themselves represented a new configuration, with 1 building added and others rearranged as compared with the basic pattern for the main program of 750 missiles, all of which had been started by mid-1961 at the latest. The sites, moreover, were peculiarly positioned some in extremely vulnerable border areas and yet offering only redundant coverage of conventional targets. Others were placed in extremely remote areas--i.e., well isolated from the basic network of missile complexes--from which no conventionally comprehensible targets at all could be inferred. These special complexes, started in 1962, were quickly completed by the end of the year but were then abandoned by the end of 1963 when the SS-11

and SS-9 deployment was begun. The critical question of their firing orientation is uncertain, but technically plausible assumptions can be adopted to produce a consistent interpretation for all 9 sites; namely, that they were intended to cover prominent sea approaches (and hence the most plausible POLARIS flight corridors) with missiles capable of propagating EMP effects. The shortlived and peculiar character of this program, and its disappearance with the obvious force reprogramming which occurred after the Cuban missile crisis, could be interpreted as further evidence that Khrushchev in extremis in 1962 did adopt the anticommand/control strategy, which provided the underlying purpose of the force adjustments undertaken during the year.

As this scenario is then played out, the outcome of the Cuban crisis--another major blow to Khrushchev's position--provided his opponents with the means both of forcing an accelerated increase in the ICBM and SLBM deployment and of removing Khrushchev from the leadership. At an enlarged Presidium meeting in February 1963, with Kozlov leading a majority opposition, Khrushchev was forced into reversals of policy on de-Stalinization, on China, and on detente. At a Presidium meeting in March 1963, Ustinov was appointed First Deputy Prime Minister and installed as head of a newly created central planning unit (Supreme Sovnarkhoz), clearly designed to reverse Khrushchev's previous defense policy at the same time. Objective evidence indicates that the major addition to the strategic force deployment entailed in the acceleration of the SS-11 program, signs of which first appeared at field construction sites in February 1964, must have been decided on no later than the

third quarter of 1963, and it is a fair presumption to trace it back to these personnel changes made in March.

The natural progress of events, one may infer, was interrupted by Kozlov's stroke in April 1963, which removed the key figure of the opposing group and probably affected the schedule to replace Khrushchev. The political disruption caused by Kozlov's illness gave Khrushchev a reprieve and may well be the basic reason why the deployment of the SS-11 force clearly occurred in two separate phases. However, it was Brezhnev, with longstanding ties to the critical defense industry center at Dnepropetrovsk,* who eventually became Khrushchev's successor, more as a beneficiary of the opposition than as prime mover.** Afterward, during the preparation of a new 5-year plan in 1965, the second half of the SS-11 deployment was added to the force structure.

*It is possible to speculate that there were political connections during this period between major Party leaders and certain missile system design bureaus and that these associations influenced the course of events. If so, then the Korolev design bureau must have been associated with Khrushchev, and Dnepropetrovsk (Yangel's bureau) with his opponents. The most concrete indication that significant patronage relationships existed concerned the fate of the SS-10 program (a Korolev product), which was successfully developed through flight tests and which may have been in an early stage of deployment in 1964. Field site silo prototypes were under construction at sites [redacted] at Tyuratam in early 1964. These sites were connected by cabling to the [redacted] soft sites where the SS-10 tests occurred. Under the practice of that period, the construction of field site prototypes indicates that actual deployment had begun. Nonetheless, construction activities at the K-3 site abruptly halted in October/November of 1964, a few weeks after Khrushchev was removed from power, and the SS-10 program died. Eighteen months later the three test sites were allocated to the SS-9 program, a Yangel product.

**Tatu, op cit, pp. 399ff, traces details of Khrushchev's removal in October of 1964 which suggest that Brezhnev was certainly not the sole actor and probably not the dominant one.

If this interpretation of the sequence of decisions which provided for the main body of the Soviet strategic forces is accurate in general, a number of implications can be drawn regarding the character of the program. First, if Khrushchev did indeed stake his internal political position on a relatively small intercontinental-range deployment and on a strategy of disengaging the United States from the peripheral theaters, then it is unlikely that his opponents in urging larger forces went beyond arguments for parity with the United States. It would not be necessary to do so in order to define a clear alternative position, and aspirants to broad political power would have a strong incentive not to decide the underlying tradeoffs between resources to the civilian and military sectors more starkly than circumstances required. Moreover, whatever Kozlov had in mind, the ultimate successor, Brezhnev, was a moderate figure in the debate, as far as can be judged. He had close ties to Khrushchev early in his career and distanced himself from Khrushchev's position gradually.

Second, it is likely that the political succession in 1964 and the debate surrounding the Five-Year Plan in 1965 brought a resolution to the basic question of force size which was stable to a first approximation. Kosygin, identified with the cause of greater investment in the consumer economy throughout the events described and installed as head of the government under the collective leadership arrangement, continued to argue this position during the early part of 1965. Though he clearly had to accede to the additional increment in strategic forces and the resource flow required, his continuation in office attests to the importance of the position he represented.

Supporting these assertions is the fact that no new complexes have been added to the Soviet land-based forces that cannot be readily associated with decisions reached in 1965 or before. Though the main bulk of Soviet deployment actually occurred after 1965, it did so within the basic structure of installations established. Adjustments to the ICBM forces after that date all either obviously or plausibly have been planned as replacements for previously deployed forces.*

Finally, it seems likely, particularly in the light of evidence from subsequent generation weapons noted below, that the increase in strategic forces effected against Khrushchev's resistance was simply grafted onto the deployed force structure without any elaborate or precise interpretation of its strategic significance. During the period of struggle, the eventual victors appear to have been more in the position of opposing, resisting, criticizing high level policy than formulating it. It seems very likely that the central focus on peripheral theaters carried through the increases in intercontinental-range forces. Though the matter is inherently more obscure, it is at least quite plausible that a focus on command/control targets in dealing with the U.S. strategic forces carried through as well. Traces of both themes are present in subsequent strategic force activities.

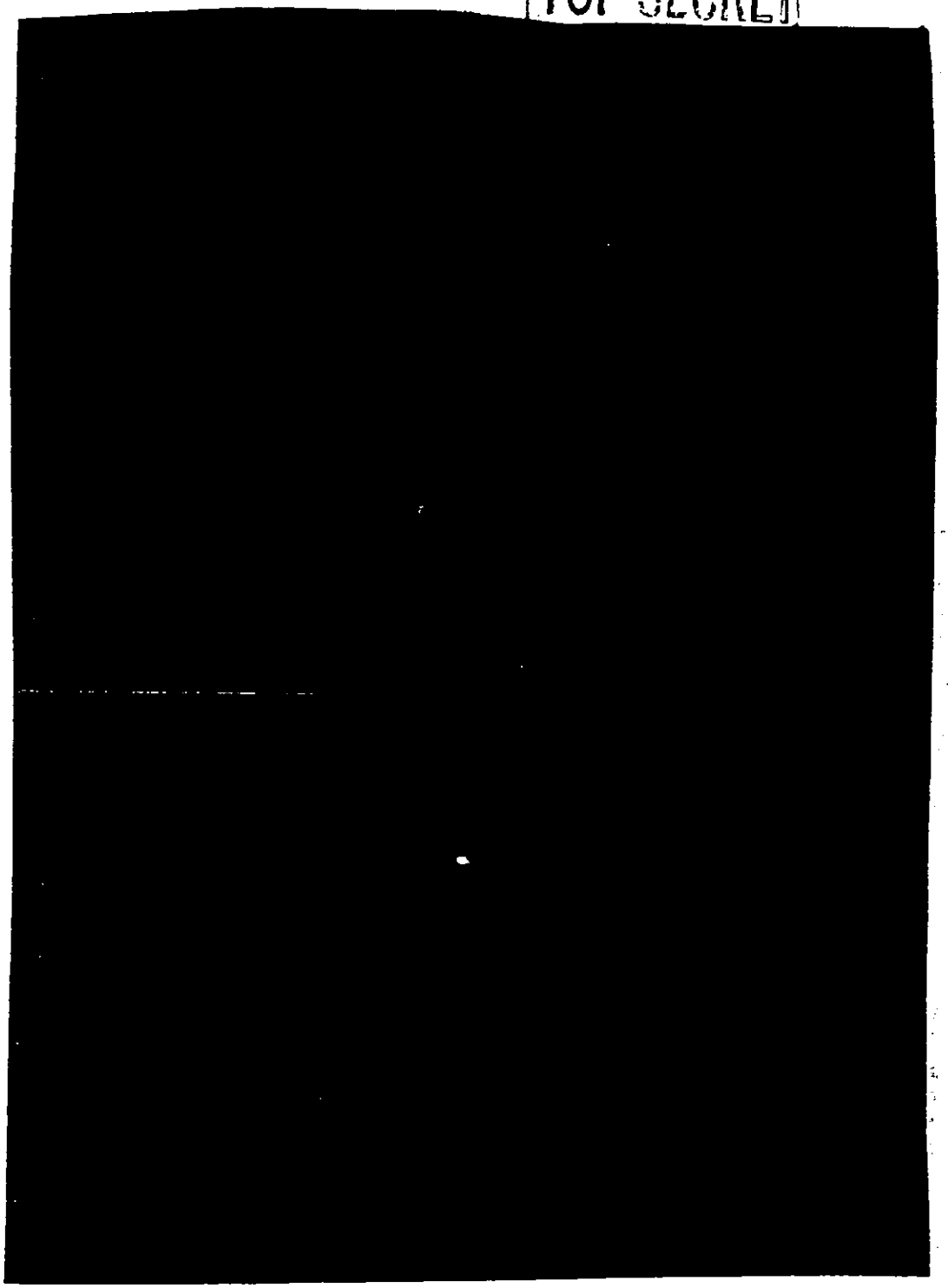
*Because submarines are not deployed in complexes, this argument cannot be extended to SLBM deployments, and it is therefore less clear that SLBM force levels were also set in 1965. The construction facilities for the submarine force were substantially in place by that date, however.

The Evolution of Technical Parameters--Missile Throw-weight and Accuracy

Whereas, under the preceding explanation of the Soviet decision process the question of force size appears to have been severed from coherent strategic calculations by the workings of crisis politics, the issues of technical design are likely to have been severed for a different reason. In the United States, critical technical design commitments are generally made in specialized organizational contexts and, particularly during the years under review, well in advance of major policy commitments. If these general tendencies have worked in the Soviet Union as well, then there is strong reason to suspect that technical characteristics of strategic forces are affected much more powerfully by practical problems than they would be under comprehensive, fully integrated strategic decision-making. An argument to this effect can be constructed to explain the increases in missile throw-weight and accuracy between the third and fourth generation Soviet systems.

Under this interpretation, the large payload capacity (throw-weight) which Soviet ICBMs possess came about less because of strategic attack designs than because missile designers faced two technical problems. The first of these was an apparent design requirement to accommodate large-yield warheads of considerable weight.

As can be seen from Table 9 (p.691), all of the Soviet missiles have been designed to accommodate weapons with yields in the megaton range, even though observations over many years reveal that the yields of at least the theater weapons used in Soviet operations exercises have



repeatedly been substantially below their design capacity.* Soviet warhead design, particularly after the 1961-62 weapon test series, has not been directed to maximizing the ratio of yield to overall warhead weight, as in the U.S. weapons program, but rather toward achieving maximum yield from the nuclear materials that were used. Atmospheric sampling after the 1961-62 tests indicated that the Soviets had achieved remarkable efficiencies of this latter sort and U.S. weapon designers subsequently discovered the recompression design principles which apparently permitted these efficiencies. It thus appears that Soviet missile designers have been required to design for the delivery of high-yield weapons without being able to count on major reductions in warhead weight or to discount the requirement in the light of actual operational plans.**

In addition to a high-yield warhead requirement, and quite plausibly related to it, Soviet missile designers appear to have experienced difficulties with the range of some of the third generation systems which had to be corrected in the fourth generation. The clearest example concerns the SS-9, mod 2.[15] This variant consists of the standard booster with an RV estimated at [redacted] with a ballistic coefficient of [redacted]./ ft.[2] Though not tested until October 1964 (nearly a year after the mod 1 RV), the mod 2 was nonetheless the RV used in the first test of the SS-9 devoted to the training of operational troops, and it was used in

*This evidence is ambiguous because of the possibility that weapon yields assumed in the operational exercises have been altered from their actual values for security reasons. The United States follows this practice, and the Soviets may do so as well.

[redacted]

80 percent of all the troop training exercises thereafter. From these and other test data, it is generally assumed that the mod 2 variant is the one most extensively deployed and that its deployment in 1965 was a matter of some urgency. The puzzle is that the mod 2 variant cannot reach most of its presumed targets in the United States from the SS-9 deployment sites unless it is fired to a range well exceeding that to which it has been tested. The maximum demonstrated range of the SS-9 mod 2 is 4,400 n. miles, whereas ranges of 4,600-5,600 n. miles are required from its deployed sites to cover U.S. ICBM complexes.* Though the necessary range increment can be granted the SS-9 mod 2 by altering underlying technical assumptions, the basic fact is that greater ranges have not been demonstrated. If the deployed system is assumed to be restricted to demonstrated firing ranges, then it could not reach a significant part of the U.S. forces. Similar if less dramatic demonstrated range deficiencies occur in the SS-9 mod 3 (an orbital bombardment system which could not reach most U.S. targets on the first orbit), the SS-9 mod 4, the SS-7 mod 3, and the SS-11 mod 3 and mod 4.

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*The SS-9 mod 2 was tested only twice at the 4,400 n. mile range, [redacted]

In light of these technical problems, the substantial throw-weight increases introduced into the SS-18 and SS-19 (Table 10, p.695) might simply have come about as a result of correcting range deficiencies in the earlier systems while continuing to meet a high-yield warhead requirement. This interpretation is supported by two basic facts. The SS-18 mod 1 RV, used on about one-third of the tests of that missile up through October 1975, [redacted] Moreover, the Soviets have gone to the trouble of demonstrating a 7,800 n. mile range for this warhead flown on the SS-18, mod 3, a 3,400 n. mile-increase over the demonstrated range of the SS-9 and a record for Soviet ICBM performance. [redacted]

The analysis of accuracy and multiple warhead systems works out very differently. Whereas high-yield warheads and consequently large missile payloads were central features of the Soviet program from its inception, multiple warhead systems and design features relating to high accuracy delivery were not. These aspects of the Soviet program appeared relatively late and seem to have been a departure from natural design tracks, a departure apparently undertaken in reaction to the U.S. strategic program and to evolution of the conditions in which offensive forces would have to operate.

TOP SECRET

[redacted]

TOP SECRET

During 1958-65 when, if the previous analysis is correct, the Soviet ICBM program was under politically imposed constraint, their RV designs diverged sharply from those of the United States. Though the RVs of the SS-5 MRBM had a ballistic coefficient in the range required to minimize guidance errors during the reentry phase [redacted] the specific adaptations for the SS-7, as noted previously, reduced this parameter to levels where reentry errors would be quite substantial. All of the Soviet ICBM warhead designs of this period were blunt and heavy. [redacted]

Beginning, significantly in 1966, this pattern shifted. The Soviets began to test much sleeker RVs with [redacted] In an apparent symbolic act which attested to their consciousness of the relationship

to the U.S. program, the Soviets tested the multiple warhead variant of the SS-9--the mod 4--on the same day in August 1968 as the United States first tested the Mark 12 MIRV.

With much greater delay, the Soviets then developed and deployed a multiple warhead system capable of placing the individual RVs on separate trajectories. This required the addition of an on-board computer and a post-boost vehicle (PBV), innovations which were not tested until 1973 on the SS-17 mod 2, the SS-18 mod 2, and the SS-19.

[redacted]

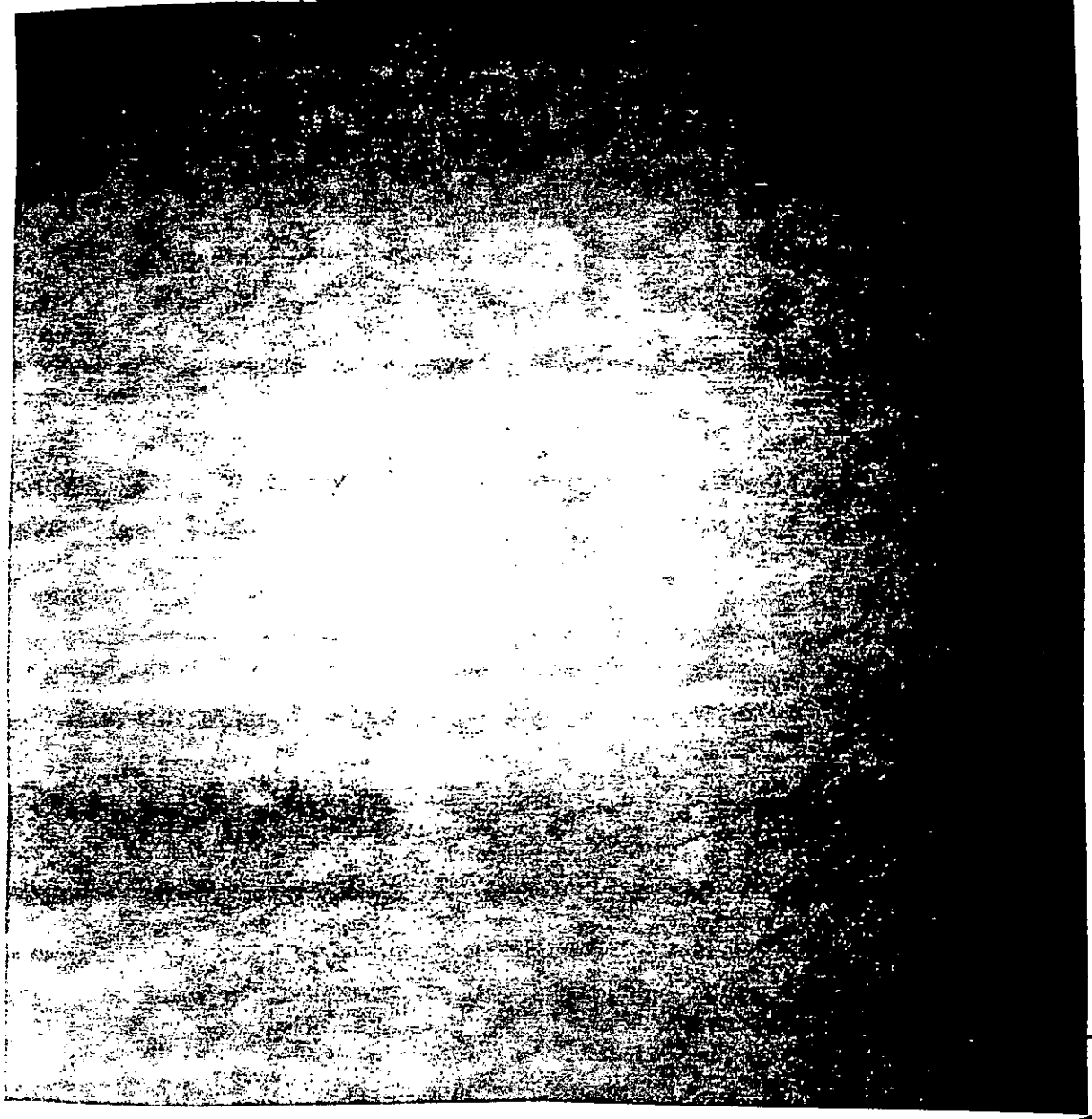
In retrospect, the shift in warhead design can be related to the major programming decisions taken in 1965. A projection of U.S. ABM deployment at that point would have forced Soviet planners to face the problem of warhead penetration, and this undoubtedly had a significant influence on their R&D decisions in 1965. Since RVs with high ballistic coefficients had been tested before, these would be reintroduced into the Soviet test program relatively quickly after the reorientation had occurred. MIRVed systems with new boosters required a full design cycle, and the 7 years to first flight test is the normal requirement for the full Soviet design cycle. Though the design decisions can be justified in technical terms, the fact that the fourth generation systems combine the earlier guidance approach-[redacted]

design philosophy induced by external factors. In all, the appearance of multiple warheads in the Soviet program and guidance advances required to put the warheads into separate trajectories can readily be attributed to stimulation in a critical planning year--1965--provided by the ABM problem and by the example of U.S. technology.

Of the fourth generation systems as they originally appeared, only the SS-19 displayed [redacted] and design features sufficiently advanced to suggest that something more than ABM penetration was at work,* that the achievement of very high accuracy to enable discrete attack on hardened targets had become a goal of the Soviet development program. [redacted] As compared with U.S. missiles, it required less elaborate computation and less extensive PBV operations for a given, achievable criterion of accuracy, but it was not believed capable of matching the best performance of the current American systems. The SS-19 RVs had high beta configurations comparable to the other Soviet MIRV systems, but in addition they were oriented at release to minimize [redacted]

[redacted]

This evidence offers some indication that the ability to attack hardened targets with multiple warheads had become a technical design objective, but there is also evidence that this objective did not have overriding priority. [redacted]



[redacted]

As the fourth generation systems began to evolve in the Soviet R&D program after 1975, the performance of the guidance system components improved markedly, and a number of guidance system design changes were introduced which made it apparent that high accuracy performance was being pursued more intensely than it had first appeared. Actual performance for the SS-19 approximated or even marginally exceeded the upper limit projected in 1973 and 1974 after the first tests had been observed. In 1978 the SS-18 mod 4 was introduced into the Soviet R&D test program with a substantially redesigned PBV which gave it, with its large payload capability, very high standards of accuracy-[redacted] A variant of the SS-19 mod 1 with significant design changes appeared shortly thereafter and achieved similar results on the test range.

Since substantial deployment of the less accurate models of the SS-18 and SS-19 had occurred before these highly accurate variants became available--thus necessitating a substantial retrofit program if improved systems were to be fully deployed--it appears that the SS-18 mod 4 and the SS-19 mod 1 variant reflected an increase in emphasis on accuracy which occurred well after the original program had been planned. The most likely time for this to have occurred was during 1971-72, when there was a major redirection of the Soviet strategic program. The 7-year delay between a decision made at that time to pursue higher accuracy standards and the first tests of the advanced systems in 1978 would be normal for the Soviet design cycle undertaking major system changes.

The simplest explanation for the sequence and timing of these developments in Soviet guidance systems is again the stimulus of the U.S. strategic program, where accuracy was both a priority design criterion and a central parameter of the strategic balance. If the Soviets had been systematically planning their program to optimize attack on MINUTEMAN silos, then high accuracy performance, or at any rate obvious attempts to achieve it, should have appeared earlier and should have been more efficiently integrated into the deployment program. What seems to have occurred is that technical designers set accuracy standards and balanced them against competing design objectives up to 1972. At that point, in the wake of the SALT II agreement, instructions were given to pursue high accuracy performance as a primary symbol of qualitative competition with the United States.

The Importance of Peripheral Missions

To deny that a comprehensive strategy is revealed in the Soviet strategic program does not require the opposite assumption that there is no coherence at all to be found. The alternative conception under consideration admits the possibility of partial coherence in the Soviet program--that is, an explicitly managed connection between the separate activities of weapon design, production, deployment, and operational planning which confers the capability to perform a military mission. It may be argued that such coherence is achieved and a military objective is successfully defined in a disaggregated planning system only by a process which has systematic and diverse manifestations and requires much time. An effectively organized military objective, in other words, should be rather obvious.

There is an obvious and consistent set of activities running through the entire history of the Soviet strategic program which does suggest the presence of a coherent mission. That mission might be articulated as the intention to establish stabilizing, protective, and usable military power in areas peripheral to the Soviet Union, notably Europe and China. As previously described, the Soviets have always given obvious priority to their military deployments against threats from the peripheral areas, and the strategic program has consistently reflected this priority. During the era of bomber deployments, the Soviets produced the medium-range Badger in much larger numbers than the longer range Bear and Bison, and they deployed the medium-range SS-4 and SS-5 missiles in significant numbers before they developed and produced an ICBM capable of reaching targets in the United States. Though the U.S. analysts have long noted the historical reasons for such priority, the natural concern in the United States about weapons capable of direct attack on North America has led to consistent discounting of the importance of peripheral capabilities to the Soviet Union and perpetual surprise when Soviet medium-and intermediate-range weapon deployments turn out to be greater than anticipated. For the same reasons, it has generally been difficult for U.S. analysts to believe that Soviet weapon systems technically capable of direct attack on the United States might in fact be deployed against peripheral targets in Western Europe and Asia. Nonetheless, it does appear that a significant portion of the SS-11 force--on the order of 200-400 missiles--was in fact allocated to such purposes.

The evidence for the allocation of a portion of the SS-11 force to peripheral missions derives largely from the coordinated force adjustments undertaken in 1968 as discussed above— [redacted] Western European orientations are somewhat more ambiguous, but at a maximum one could count a similar figure of 200 missiles oriented toward Europe and the Middle East.

Without access to the fine-grained structure of Soviet planning, it is difficult to associate technical capabilities with the peripheral mission, but it is at least a reasonable surmise that in part the concern for accuracy is attributable to theater military operations. As noted above, [redacted] If this reflects a concern for precision attack in theater engagements, that might provide some of the motive for accuracy advances and might relate to the numerous reduced range firings in recent years from operational bases in the Far East to Kamchatka.

*The changes involved shifts of several tens of degrees toward China and the Far Eastern theater and toward the Middle East.

The Question of Parity

The sustained Soviet commitment to large strategic forces allocated to theater operations poses very directly the question of Soviet intentions* regarding the strategic balance with the United States. Did the principle of dominance which the Soviets apparently sought to apply in the European and Asian theaters carry over to their posture on intercontinental war with the United States? This, as noted, is the natural supposition if the Soviet program is assumed to reflect comprehensive strategic objectives. Or, on the contrary, did a competing priority given to theater missions induce the Soviets to follow the less demanding principle of parity with the United States? Under the assumption that partial objectives have been at work, this latter proposition seems more plausible, not only for the political reasons noted above but also because of the simple fact that long-range missions did not have deep historical roots in the Soviet military structure, a condition which reflects different underlying organizational commitments to global and theater balances.

*Use of the word "intentions" in this analysis, it should be noted, does not require that the Soviets explicitly formulated their strategic problems in terms of the questions posed here. It is quite possible for them to have programmed either the same or different relative capacities into their theater and intercontinental-range forces without explicitly deciding upon a justifying principle. The fact that applicable principles can be extracted from published literature does not allow inference of formally explicit intentions. Strategic missile complexes and submarines are not likely to be constructed without the most formal authority to do so; treatises on strategy even in the Soviet Union can probably be published without deeply absorbing the energies of the Party Presidium. "Intention" is therefore used here in such a way as to cover implicit as well as formally defined principles. The degree of explicitness that a given principle has actually achieved in the Soviet planning system is a subsequent and much more uncertain question.

Summary measures of current strategic forces do not provide clear answers to these questions. It is generally accepted that the Soviet forces have exceeded those of the United States in aggregate numbers of launchers, in payload, and in gross yield, but only by marginal amounts if bombers are included in the calculation. U.S. forces are superior in warhead numbers and in accuracy. The actual strategic balance does not admit of any single, decisive calculation which would provide the basis for a reliable imputation of intentions. Since the surge in Soviet strategic weapons deployment has occurred so recently and since the modernization program matching U.S. MIRV technology is still in progress, the status of parity as a principle governing Soviet deployments is destined to be uncertain and controversial until more time elapses.

There are nonetheless some observations which support the parity thesis. The number of weapons which have emerged in the ICBM program is not wildly out of line with what Soviet planners might have projected as a matching response during the period from 1963 to 1965 when the large increases were authorized. The Five-Year Defense Program recommended by the U.S. Air Force for fiscal year 1964 projected 1,950 MINUTEMAN missiles by the fifth year, and the version approved by the Secretary of Defense envisaged 1,300.* These numbers were respectively 1,400 and 1,200 for fiscal year 1965, the last budget before the 1,000 ceiling was established. If the Soviets believed that the 1,000 MINUTEMAN ceiling which McNamara announced in early 1965 would hold, then the second phase SS-11 deployment which they apparently programmed later in that year would exceed a simple

*See above, p 583.

matching of launcher numbers. It would be quite possible, however, for Soviet planners to hedge against a higher figure, and though still attempting parity to program 1,500 ICBMs for their force structure. This is particularly plausible if they assumed that their 5-year planning cycle would saddle them with rigidities not experienced by the annual American cycle.

Assuming that they did overshoot on the basis of such a calculation, then the later [redacted] of SS-11 sites to peripheral targets may be seen as a reallocation of this excess capability. If the high estimate (400 missiles) of SS-11s for this purpose is correct, then the disparity in numbers of ICBM launchers would have been almost entirely absorbed in the peripheral mission hypothesized to have greater priority.

A similar analysis can be applied to the relative numbers of SLBMs. If Soviet planners were using U.S. Navy and OSD projections to find an appropriate matching number for submarine deployments, they would have confronted a much narrower range--41 to 45 submarines and 656 to 720 missiles. They would, however, have faced the problem of qualitative comparison. Since the question of how G-and H-class submarines ought to be related to POLARIS in overall capability would not be easily answered, it is conceivable that they adopted a conservative rule which allowed only the Yankee-class or later vintage submarines to count against the POLARIS force. If, as summarized in Table 11 (p.707), this rule is applied and if those submarines are excluded which are not available for operational missions because they are undergoing overhaul, then the Soviet SLBM force did not match the POLARIS/POSEIDON force in SLBM launchers until after 1975.

[redacted]

TABLE 11

SOVIET SUBMARINE DEPLOYMENTS 1965-1975

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
A. On-line (Total) subs/missiles	29/82	32/91	30/85	31/101	35/179	41/290	47/412	47/479	52/516	56/560	61/629
1. a) G.H.Z. class subs	29	32	30	30	29	28	26	21	24	24	23
b) SS-N-4 SS-N-5 Missiles	82	91	85	85	83	82	76	63	72	72	69
2. a) Y, D class subs				1	6	13	21	26	28	32	38
b) SS-N-6 SS-N-8 class missiles				16	96	208	336	416	444	488	560
B. Off-line (Total) subs/missiles	7/20	6/17	7/20	7/20	6/17	5/14	6/17	6/17	7/73	10/121	11/137
1. a) GHZ	7	6	7	7	6	5	6	6	3	3	3
b) SS-N-4 SS-N-5	20	17	20	20	17	14	17	17	9	9	9
2. a) Y, D									4	7	8
b) SS-N-6 SS-N-8									64	112	128
Grand Total Subs/missiles	36/102	38/108	37/105	38/121	41/196	46/304	53/429	53/496	59/589	66/681	72/766

[redacted]

[redacted]

There are, of course, asymmetries in these counting rules which are unlikely to be accepted as legitimate by the United States. If the question, however, is a plausible reading of Soviet intentions as these were formulated or implied at a critical phase of their force programming process, then a case can be made that parity has been the "intention."

Character of the Modernization Program

Beyond the very clear Soviet intention to exercise strong power in areas peripheral to the Soviet Union and to balance U.S. strategic power in some fashion, it is difficult to discern the presence of partial objectives exercising significant organizational influence over the Soviet strategic program, and it is important to note that no other identifiable principles seem to have achieved commensurate stature. Nonetheless, some important clues about the character of the modernization process can be derived from the pattern of ICBM construction associated with that process.

The original program as it appeared following the decisions in 1970 concerning the Five-Year Plan for 1971-75 clearly involved a large missile deployment supplemental to the SS-9 force. If this original deployment pattern is projected for all the SS-9 launch groups, i.e., the addition of 4 new silos to each 6-silo group, the overall increment would have been 192 missiles,* bringing the large missile component of

*This figure assumes that the SS-9 emplacements at Aleysk--not part of the 1970 program--would ultimately have been included.

the Soviet forces up to approximately 500 launchers. The program, moreover, was highly concurrent, with field silo construction starting at the same time as the test center prototypes--well in advance of the first test launches. Though there is some ambiguity, the evidence available seems to indicate that this new phase of deployment as it stood in 1970 involved not the fourth generation systems which eventually emerged but rather advanced (MRV) variants of the third generation--the SS-11 mod 3, perhaps the SS-9 mod 4, or conceivably a variant never observed and identified by the United States. At the 4 SS-9 complexes included in the 1970 program, the new silos under construction were the extremely well-hardened [redacted] configuration which ultimately came to house the SS-18, but the [redacted] silos at the field complexes in 1970 were several meters larger than the [redacted] silos converted after 1973 from the [redacted] configuration expressly for the SS-18.* The larger [redacted] would house the SS-9 mod 4, whereas the shorter version would not. Similarly, two configurations of varying length for the shorter-version III-G silo, associated with the SS-11 mod 3, appeared at Derazhnaya and Pervomaysk in 1970. The larger [redacted] required for the SS-19 only appeared with the beginning of SS-19 deployment construction in 1974. Strictly interpreted, therefore, the new deployment phase started in 1970 indicates a very substantial commitment to improved hardening but not yet to deployment of the fourth generation missiles.

*Both silo lengths for the [redacted] were constructed at the Tyuratam test range in 1970, but only larger versions appeared at the field complexes in that year.

It is apparent from the evidence cited above that a substantial redirection of the 1970 deployment plan was undertaken in 1971. Construction activity ceased almost entirely beginning in August 1971, continuing intermittently and sporadically at only a few sites. Because of this interruption, 4 years elapsed before all of the construction begun in 1970 had been completed.* Moreover, the pattern of deployment shifted markedly when normal construction activity resumed in 1973. These events interrupted the 5-Year Plan whose implementation had just begun and reversed decisions which had been made in the course of the normal planning cycle. For all these reasons this episode is the most dramatic of the several critical decision points in the history of the Soviet strategic programs.

This sudden, extensive, and apparently unanticipated reprogramming of the deployment plan was evidently related to the arms limitation negotiations in progress, not only because the timing of the episode is clearly connected to the May 1971 diplomatic agreement to limit offensive and defensive systems** but also because one of the main effects of the adjustments in deployment was to hold the large missile component of the Soviet forces basically at the level of the assigned SS-9 deployment, a sub-limit which the United States insisted upon in the negotiations. Though the original 20 new [redacted] sites were completed after the resumption in construction, no additional new sites were started, and all subsequent [redacted] construction was accomplished by

*The mere fact that the silo construction interrupted in 1971 was resumed and ultimately finished makes the 1971 episode unique. As frequently noted, the Soviets have at critical moments of decision abandoned contemplated missile sites already under construction, but on no other occasion have they suspended construction for an extended period and then resumed it.

**See next page.

**As reported by John Newhouse in his officially inspired account (Cold Dawn, pp. 214-19) of the strategic arms negotiations, President Nixon and Chairman Brezhnev announced in May 1971 that they had reached an agreement in principle to impose simultaneous limits on both offensive and defensive strategic forces. Both sides saw this as a breakthrough achieved via back-channel negotiations independent of the formal negotiating teams.

conversion of existing [redacted] silos; that is, by phasing out SS-9 launchers. Such a proximate relationship to the negotiations, however, does not mean that the requirements of the SALT agreement provided the sole or even primary motive for the deployment adjustments. In fact, there is some reasonable presumption that independent purposes also drove the reprogramming effort, since it began well in advance of the actual signing of the agreement. Taking the observed 1970 program as a baseline--strictly interpreted to include only the advanced variants of the third generation--one can derive two reasonably coherent elements of the modernization program as it emerged from the period of reprogramming.

Shifting Emphasis from Quantitative to Qualitative Aspects of the Strategic Balance

When construction at the ICBM complexes resumed during the course of 1973 and 1974, three characteristics became immediately apparent. First, the program involved new missile systems--the SS-16, 17, 18, and 19--all of which underwent their first tests at Tyuratam [redacted] beginning in March 1972. Second, by previous standards, the pace of construction had slowed. The resumption of construction, as noted, was phased in over 3 years rather than undertaken simultaneously. For the SS-17 and SS-19, at least, field site construction ran a year or more behind the beginning of the test program.*

[redacted]

Third, all of the deployment activity which followed the reprogramming period involved the conversion of old silos in accord with the requirements of the SALT I agreement. There is a clear suggestion in this pattern that the qualitative improvements represented in the fourth generation systems were being injected into the deployment schedule somewhat earlier than originally intended and that the pace of deployment was being relaxed--marginal adjustments which indicate that increased weight was given to qualitative aspects of strategic capability during the period of reprogramming. This would be normal, of course, in the wake of the SALT I agreement, which granted the Soviets more than quantitative parity and explicitly precluded further increases in launcher positions while allowing qualitative improvements--an area where the Soviets quite apparently lagged behind the United States.

The strongest supposition regarding the timing of the fourth generation systems holds that as of 1970 these weapons were projected for a subsequent deployment phase not yet finally decided upon and that SALT precipitated a revision in the plan in order to introduce them immediately. A number of details associated with the test programs at Tyuratam support this thesis. Construction on test sites clearly associated with the SS-17 and SS-19 coincided with decisions to halt SS-11 field construction and to undertake a review of the program. There were some unique arrangements made at the test range, moreover. The two systems, which originated from different design bureaus, shared some facilities at the test range most notably a [redacted] command silo which also served the SS-11 mod 3. Since physical separation between missile systems and between design bureaus had traditionally prevailed at the

range, this arrangement suggests the sort of improvisation that a sudden advance in the schedule of development would require. The technical difficulties experienced in the early versions of the SS-19 and the fact that flight testing for the SS-17 and SS-19 was so far in advance of field site construction, also support the thesis that there was an attempt to advance the schedule of fourth generation deployment because of the impending SALT I agreement.* Indeed, that was probably a necessary condition for the acquiescence of Soviet military planners to the SALT I agreement.

Evidence of a trade-off between the timing of qualitative improvements and the quantitative dimensions of the strategic balance also comes from many characteristics of the construction program after 1972 which slowed the rate and diminished the scale of deployment at least up to the middle of the decade. In addition to a phasing-in of construction more gradually than previously and the lag between test launchers and field site construction, a substantial part of the SS-11 force was exempted from immediate retrofit with fourth generation systems. Deployment of SS-11 mod 2 and mod 3 missiles [redacted] also continued after the reprogramming period, and nearly half of the SS-11 force, beginning in 1973, received a light upgrading of the silo involving modifications to the external doors and perhaps minor changes in the internal components. Since this would presumably not have been done had conversions to the SS-19 [redacted] configuration been contemplated, the inference was that less than half of the SS-11 deployment was scheduled for replacement by the SS-19, as became apparent in the course of the subsequent SALT II negotiations.

*The evidence suggests that the Soviets did advance, against a previous plan, the date at which initial deployment activities were started. Either by intentions or as a result of unavoidable constraints, however, they did not force the pace of the overall programs. The early start resulted in unusually extended construction times.

Assuming that the negotiations reflected the deployment plan, the SS-19 force appeared to be evolving toward an eventual deployment of 310 launchers.

SS-17 deployment began at Yedrovol in 1974 at a relatively modest pace compared with previous construction rates. Construction began for [redacted] posts in 1975 at the second complex intended for the SS-17--Kostrama--but not for launcher positions until 1977. Though all SS-9 complexes eventually became involved in retrofit for the SS-18, the pace of this activity remained well below both capability and previous practice. Finally the potential warhead loading of the SS-18 force in particular was reduced by the considerable attention given to the single warhead variants (mod 1 and mod 3). Of the first 50 flight tests of the SS-18 at least [redacted] involved single warhead configurations, a pattern which suggests that a substantial part of the deployed systems was intended to carry single warheads, at least in the original deployment plan for these systems.

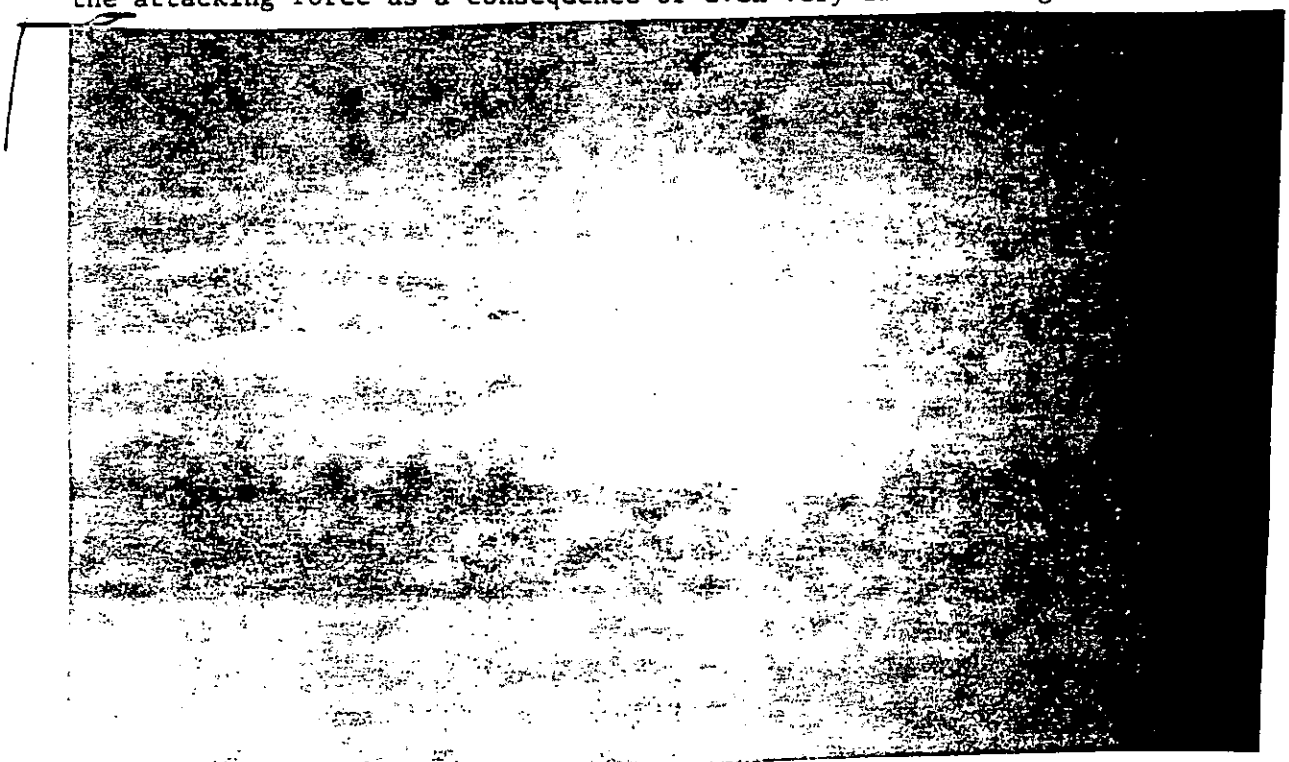
Since the throw-weight increases and accuracy advances of the fourth generation systems allowed significant improvements in the central parameters of offensive capability--yield, accuracy, and warhead numbers--the appearance of these systems has occasioned a widespread inference in the United States that the Soviets are pursuing some version of the counterforce damage limiting mission--an ability to strike preemptively and selectively at U.S. ICBM installations, driving U.S. retaliatory capability to minimal levels and leaving a post-attack force balance decisively favoring the Soviets. This inference fits with the counterforce orientation which has been apparent throughout the entire

development of Soviet strategic forces and supplies the coherent rationale missing in the technical configuration of the third generation. It can be sustained from the technical performance of the fourth generation systems, but not with the clarity that would be expected if deployment had been systematically planned for this purpose from the outset. The retrofit program for replacing existing missiles with the improved systems was planned well short of its full potential, suggesting that an economizing trade-off between qualitative improvements and quantitative force levels took place. The resulting counterforce capacity was not as decisively established against strategic forces based in the United States as it was against forces deployed in the peripheral theaters.

A force of 300 SS-18 and 300 SS-19 missiles, equipped with MIRV variants, could produce a total of at least 4,200 warheads. With the accuracy/yield combination of [redacted] per RV for the SS-18 mod 2 and [redacted] per RV for the SS-19, this force could approximate 99 percent damage to the MINUTEMAN force, using the standard equations for single-shot kill probability. Such values were within the range of what seemed to be reasonable technical projections of performance of the SS-18 and SS-19 systems based on the original system designs. Such a result, however, depends on using approximately 4 warheads for each target, a procedure in which the Soviets could not vest great confidence given interference effects among

attacking warheads.* A force mix with only half of the deployment allocated to multiple warhead variants might produce around 2,400 warheads, implying roughly 2 warheads for each MINUTEMAN silo in the basic counter-force attack.** In order to achieve 99 percent damage with this force loading, using yields no greater than 1 MT to constrain intersilo interference, accuracies of at least 0.14 n. miles CEP would have to be achieved for the operational forces, implying test range results approaching 0.1 n. miles CEP. [redacted]

*At accuracies in the range of 0.2 n. miles there would be potential interference effects for weapons over 1 MT yield not only between warheads attacking the same silo but also between those attacking adjacent silos at the MINUTEMAN bases. In order to minimize these effects, using 4 warheads per target, the attack sequence would either have to be strung out over several hours, thus exposing it to retaliatory interruption, or it would have to achieve extremely tight timing-arrivals of all warheads within a period of a few seconds--with an attendant risk of disaster to the attacking force as a consequence of even very small timing errors.



At the extreme, a force of 334 SS-19 missiles with 6 warheads each (arranged in pairs of 2 with each missile attacking 3 silos), could approximate the theoretical requirements of a counterforce attack--if yet higher standards of accuracy were achieved--without involving the SS-18 program at all. That would leave no leeway, however, for imperfect reliability of the launcher or imperfect performance of the guidance system. Alternatively, a force of 300 SS-18s (mod 4), each with 10 warheads of advanced accuracy, could meet theoretical requirements with enough excess to cover launcher reliability problems. This force, however, would also be highly dependent on what cannot be tested in advance of actual war, i.e., the achievement of test range accuracy standards by the entire force under combat conditions. The risk to Soviet military planners of either of these deployment patterns would be substantial.

As the overall fourth generation deployment is compared with various conceptions of how the counterforce mission against MINUTEMAN silos might be performed, none of the available approaches appears to have been systematically embodied in the deployment plan as of the mid-1970s. An approach dependent on achieving intricate attack timing would not be consistent with the diversity of systems which appeared. There were 9 system variants* involved in the Soviet program after it emerged from the process of reprogramming, including single warhead variants for each of the fourth generation systems. The different operating characteristics of these systems would significantly complicate the planning and execution of a precisely timed attack; diverse deployment is not what one would expect to see if that were the intention. The deployment of the SS-19, whose basic design [redacted] most

*As of 1976 and including the SS-20.

nearly approximated the requirements of advanced accuracy attack, was reduced by approximately 100 launchers after 1975; with the diminished strength even full MIRV loading would leave little leeway to compensate for launcher reliability problems. The SS-18 program, as noted, gave significant attention to single-warhead variants, and the mod 4, which might provide the basis for a clearly defined counterforce attack capability, was not even tested until 1978 and therefore did not offer very direct indication of the original intentions of the fourth generation program.

The evidence clearly indicated that the Soviets were seriously concerned about attacking hardened targets and that they were developing multiple warhead systems of advanced accuracy to give them improved capability for this purpose, but it does not follow that they had in mind as hard targets the full set of MINUTEMAN launch silos. The scale of the fourth generation deployment of MIRV systems and the technical diversity of the overall ICBM program as readily suggest that they imagined more restricted target systems than the standard U.S. attack scenarios require and that there is a diversity of missions across the overall effort.

The Special Role of Command/Control

As the ICBM construction program emerged from the pause of 1971, it became apparent that increased emphasis had been given to communication links and to other technical elements associated with command/control. A number of hardened antennas were introduced at the missile sites. At least 8 different designs were involved, and their deployment in

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significant numbers cut across the various classes of missile systems, thus indicating that they played an integrative function associated with the command structure rather than merely servicing the individual missile systems. Special buildings and optical calibration equipment appeared at all the missile complexes at the same time. Beyond that, a significant expansion of the airborne command/control system and organizational changes permitted more direct control of strategic operations at all echelons by the General Staff. Together with the large increases in hardness represented by the [redacted] silo configurations, this activity gave clear indications that the Soviets were intent on preserving some force elements and a coherent command structure in the face of attack.

Since strategic forces capable of surviving attack and responding thereafter to central direction are an important element of nearly any strategic conception, by itself the activity relating to the command structure does not give clear indication of underlying intentions. Set in historical perspective, however, this dimension of the Soviet program, together with some details of the fourth generation system, raises a significant possibility that there is a connection with events of the early 1960s, that an emphasis on command structure as a central focus of attack was indeed established, as hypothesized above, in 1962 and that it has been sustained as a coherent sub-mission of the strategic forces. Such an inference can be made indirectly from the obvious concern for command structure protection; some characteristics of the SS-17 program provide additional evidence, albeit with a great deal of ambiguity.

Particularly since there is some direct evidence that Soviet design bureaus are involved in the deployment of missiles, the possibility clearly emerges from this pattern of events that the Yangel/Utkin bureau was directed toward a particular strategic mission, and both the technical designs and scale of deployment were responsive to that mission. If so, then the most plausibly attributed mission is attack on the U.S. military command structure launch control facilities, communications installations, and command posts. A 500-missile force--the total deployment of Yangel/Utkin products--fits well with such a target system, allowing substantial redundancy to accommodate reliability problems and imperfect preemption (i.e. loss of some part of the force to U.S. attack).* Some of the distinctive features of the SS-17 could also be explained by such a mission. The large payload of the system would allow every large-yield warhead for attacking hardened command posts to be carried to full intercontinental range. [redacted] The latter flexibility would be useful because it permits different warhead loadings and different attack strategies for different kinds of command structure targets. The flexibility provided by rapid retargeting capability would be less important for a mission requiring coverage of a relatively restricted number of targets.

*There are roughly 120 launch control facilities including the operational force and training sites. WSEG 159 estimated that comprehensive coverage of the communications system would require 200 targets at the outside.

Other aspects of the modernization program of the strategic forces--particularly developments in the SLBM force--could not be observed in as fine detail as ICBM construction activity and therefore offer less elaborate indications of the principles underlying the program. The new missile systems demonstrated after 1972 had a substantial range advantage over the SS-N-8: this afforded greater protection and greater operational control of the submarines by allowing them to cover targets from ocean areas adjacent to the Soviet Union. Changes to the submarines themselves, incorporated in the Delta class, largely involved increases in missile size and the number of missiles carried. The noise generation properties of the submarines were not dramatically improved. The observable activity thus fits the solidly established themes of greater protection for force elements and greater control over them. The advanced SLBMs were tested with MIRV warheads, but their accuracy/yield characteristics did not offer hard target attack capabilities. The major event required to link the SLBM force to the hypothesized command structure attack mission and to give the submarine mission a more assertive character--i.e. depressed trajectory, short-range firings of SLBMs useful for a decapitating surprise attack--did not occur.

In general the Soviet modernization program seemed to be producing a substantial technical diversification and differentiation of function within the overall force limits imposed by the SALT I agreement. Nine system variants were being deployed in serious numbers in a pattern suggesting a mix of specific purposes. There was ample indication that the possibility of actual war was being taken very seriously; and should

war occur for whatever reason, Soviet strategic operations designed to limit their own vulnerability and prevent decisive defeat could have constituted a severe threat to the United States--particularly if the hypothesized attack on the command structure actually materialized. The most reasonably imputed threat, however, appears to be less focused on the MINUTEMAN silos and more defensive than would be imputed by a projection of U.S. strategic concepts and technical aspirations on the Soviet program.

Evolution of the Soviet Operational Posture

Observation of the Soviet missile test ranges after 1965 reveals that serious effort was devoted to producing an operationally usable strategic capability. All the main missile systems which formed the predominant element of the strategic forces underwent extensive tests--numbering in the hundreds for each of the third generation systems by the early 1970s. Much of this testing was undertaken with reduced scientific measurement, and it is assumed therefore that a substantial purpose of the program has been the training of operational troops. From this, it is a reasonable inference that the Soviets, like the United States, have struggled with the many detailed problems involved in integrating basic missile technology and troop organizations to achieve operational capability.* It must be assumed that by sometime in the late 1960s the Soviets could actually undertake the swift and enormously damaging attacks that modern weapon technology made feasible, but that as with the United States this was more difficult and occurred much later than popularly imagined.

*There is also evidence of other activity required to produce actual military capability--e.g., geodetic mapping and gravity measurements.

The state of readiness at which the Soviets have chosen to maintain their operational capability is, however, a separate question. The effort expended to create an operational capability implies a clear desire to be able to initiate war on short notice, but there remains a highly significant matter of degree--how short the notice as compared with U.S. capabilities? In the period after 1965 improvements occurred in the operational readiness of the Soviet forces apart from those produced as a byproduct of greater protection, but even with this trend the Soviet operational posture, as far as can be observed, remains much more cautious and restricted than that of the United States. The persistence of this pattern of a relatively low alert deployment despite continuing doctrinal emphasis on preemption, and technical preparedness for rapid response offers continuing indication that force size and force operation questions have been decided in separate political contexts in the Soviet Union, as they have been in the United States. The primary evidence here is the observable operation of the strategic missile submarine fleet.

Operational patrols by Yankee-class submarines began in 1969, apparently as soon as the first submarine was fully outfitted and its crew fully trained. By the end of 1972 Yankee-class patrols had evolved to a stable pattern, noted above, in which 4 submarines were maintained on patrol in obvious proximity to the United States--2 each in the Atlantic and the Pacific. Though the introduction of these patrols represented a significant increase in readiness, several aspects of the

operational deployment pattern indicated the presence of continuing restrictions. First, the Yankee-class patrols continued to be confined to areas which would require 1 or 2 days transit to bring the submarines within the normal firing range (1,050 n. miles) for the SS-N-6 missile.* Second, though the Yankee-class submarines had [redacted] This is a less secure procedure, more removed from the requirements of combat conditions than that followed by U.S. SSBN patrols. Finally, the Soviet submarine patrols were not expanded at the same pace as the basic inventory, and by the mid-1970s the Soviets were obviously maintaining a rather small percentage of their available force on patrol and ready for strategic operations on short notice. The reasons for such caution can only be a matter of speculation,** but the pattern offers additional indication that a separate decision process involving separate criteria does govern this dimension of the Soviet military effort.

[redacted]

occurred a clear improvement in combat readiness, as a concomitant to providing greater protection and the assurance of continuing political authority after attack. The highly redundant communications system which provides protection also provides linkage directly from the general staff to the field command sites, thus permitting rapid reaction times. The high quality HF communications installed between Moscow and the missile sites could be intended to secure quick reaction times for preemptive attacks or could be a part of the very extensive program of hardening apparently intended to enable the Soviet strategic forces to conduct strategic operations after experiencing attack.* The Soviets have reportedly practiced both preemptive strikes and rapid retaliation, and demonstrated the ability to launch a coordinated strike of ICBMs, SLBMs, and bombers.

[redacted]

*Long-range HF communications requiring inonospheric reflection would be disrupted by the effects of nuclear explosions for periods of 24 hours or more, and thus according to U.S. technical analysis would not be reliable for purposes of rapid retaliation in the immediate aftermath of a first strike.

[redacted]

communications and hence worked to reduce reaction times. There has not been any demonstration, however, of a rapid reaction time from the normal alert posture—i.e., apart from prescheduled exercises. The changes made in 1967 probably resulted from dissatisfaction with the responsiveness of the Soviet forces during the Arab-Israeli war in June of that year.

Another set of observations related in principle to the operational readiness question, but also difficult to interpret, concerns nuclear weapon storage sites. By the early 1970s the United States had identified [redacted] separate, elaborate, and highly secure facilities for nuclear weapons storage. Two types of facilities, labeled National Nuclear Weapons Storage Sites and Special Operations Centers respectively, were distinguishable from several hundred much less elaborate facilities associated with missile sites, some Red Army units, and other tactical forces. [redacted]

the possibility that the Soviets had established just such a posture cannot be completely excluded.

Despite the uncertainty, then, which surrounds details of Soviet operational procedures, a general theme emerges with some clarity: Presumably to achieve more secure control over operational strategic forces in peacetime, the Soviets have demonstrated over time a tendency to sacrifice readiness and risk greater damage in the event of sudden and unexpected war.

The Soviet Program in Perspective

More than two decades have now passed since 1958, the historical baseline for the operational deployment of ballistic missile weapon systems in both the Soviet Union and the United States. The events of these 2 decades have provided a great deal of information about Soviet strategic forces. The deep uncertainty about their immediate capabilities which so agitated the American political system in 1958 has long since disappeared, and a great deal of basic information is routinely available. The current force balance is known to a close approximation, and the important uncertainties have to do with more subtle questions--the projection of the evolving force structures over 5 years or more; the performance of the military organizations; the strategic intentions underlying the entire effort. The progress made in understanding the immediate weapons balance is an important accomplishment and an element of stability in the strategic situation, but it is also true that the large-scale deployment of strategic weapons and the capacity for destruction thereby conferred has made the more difficult problems of strategic

intention and organizational posture far more important. With this shift in interpretive requirements, uncertainties still dominate the problem, and analysis is still critically influenced by the initial assumptions made.

The alternative perspectives on the Soviet strategic programs developed in the foregoing discussion serve to emphasize and make explicit this dependence on initial assumptions. They also honor the methodological prescription that, given irreducible uncertainties, critical assumptions should be continuously worked against each other for the analytic discipline thereby afforded. For all that, however, in the end the subject wants resolving judgments, tentative though they may be. The competing perspectives do not appear to be equally likely.

On balance from the perspective of 20 years the Soviet strategic forces are best judged to have developed under a diversity of influences, and as a result the size, technical composition, and force dispositions do not appear to have been systematically integrated around a clearly defined, general strategic objective.

The commitment to development of basic weapon technology established in the immediate aftermath of World War II, has carried undiminished to date. The activities of the research institutes, the weapon design bureaus, and the test centers have been stable relative to other aspects of the Soviet strategic effort and comprehensive in their coverage of the pertinent areas of science and technology. This activity appears to have produced a number of very specific weapon design goals which have influenced the evolution of Soviet forces. In R&D, virtually all

aspects of strategic capability are being seriously pursued, and the overall effort seems to reflect a partial, well-established, indigenous objective not particularly sensitive to changes in the U.S. threat or world political conditions.

Similarly, a concern with force balances in the theaters peripheral to the Soviet Union emerges over the 20-year history with considerable clarity. Force deployments which seem large relative to plausible mission requirements have been undertaken on an orderly basis. If precedence in time can be assumed to reflect precedence in commitment, these forces can also be said to have had priority. Comfortable dominance in the peripheral theaters can be stated as an apparent Soviet objective though it does not explain the entire force structure.

By contrast, intercontinental-range strategic capability directed primarily against the United States has had a far more turbulent history, and the overall pattern has been less coherent. Though the judgment must be constructed from indirect traces, it is reasonably clear that intercontinental deployments against the United States--that is, the main ICBM and SLBM programs of the period--were the subject of high-level political dispute within the Soviet leadership. The large-scale deployments of the late 1960s were rather clearly affected by reactions to strategic pressure from the United States during the 1961 Berlin crisis and the 1962 crisis in Cuba. These reactions appear to have been chiefly political in character, and they produced an imbalance between the scale of deployment and the technical characteristics of the deployed systems. The instances of apparent improvisation and ad hoc adjustments are reasonably frequent--the Cuban deployment, the special SS-4/SS-5 sites

within the Soviet Union; the careers of the SS-11 and the Yankee-class submarines; the relatively sharp shift in RV technology matching the U.S. ABM penetration program; the reorientation of SS-11 sites to peripheral mission assignments; and the sudden redefinition of the program in 1971. Though underlying motives are inevitably a matter of conjecture, the thesis can be sustained that the Soviets, in the aftermath of the 1962 Cuban crisis, sought parity with the United States under somewhat conservative counting rules, and they did not authoritatively pursue general strategic purposes much beyond that criterion.

The military planning system which has managed the Soviet strategic program is highly centralized, and the long tenure and wide scope of responsibility of a man like D. Ustinov is without parallel in the U.S. government. Nonetheless, there is evidence of significant organizational distinctions within Soviet systems which affect overall Soviet strategic posture. Decisions on development, on large-scale production and deployment, and on operational management are treated in noticeably different ways and apparently are subject to different influences. Of these, the production and deployment decisions seem to have been the subject of greatest political dispute and most sensitive to the behavior of the United States.

Throughout the entire period in question, the preponderance of available evidence has indicated that the Soviets have contemplated strategic operations directed primarily at opposing military targets, but the size and technical capabilities of their forces have not approximated very closely the requirements of a counterforce mission

directed at MINUTEMAN silos or at operating submarines. From a review of the period there emerges a moderately strong and quite important suggestion that at a point of relative inferiority in the early 1960s the Soviets may have adopted a strategic conception focusing on either retaliatory or preemptive attack against the U.S. command and control system. This conception may have come to be associated with a component of their strategic forces numbering some 500 missiles.

The underlying motives of such a posture must be inferred and can only be advanced as hypothesis. The most natural inference, however, is that the motives are more defensive than offensive in character. Because even massive destruction of the U.S. command structure will not prevent sporadic, uncoordinated, but enormously damaging retaliation by American weapon commanders, this type of attack is not attractive in support of political objectives other than survival. Hence, it does not threaten basic deterrence. As long as coherent decisions are being made and some hope persists that war can be avoided, cognizant Soviet decisionmakers are not likely to initiate attack on the U.S. command system. If, however, the Soviets in planning their forces have been worried not about supporting the projection of their political power but rather about conducting useful defense if strategic war is imposed on them against their will, then the command structure attack has two interesting advantages. If executed preemptively, it would preclude the worst case from the Soviet point of view--i.e. a fully coordinated American attack. It would also give some chance, albeit very slight, of escaping with very little damage should isolated U.S. force elements fail to respond.

Chapter XIII

PERSPECTIVES ON ARMS CONTROL

The evolution of formal agreements imposing limits on the deployment of U.S. and Soviet strategic forces is a major event in the history of each nation's strategic program. Even as the two countries engaged in bitter rivalries and even as their scientific and military establishments experienced the extensive competitive development recorded in previous chapters, there appears to have been at high levels of both governments a general realization that the destructive potential of the arsenals being created mandated some form of mutual accommodation. The slow and cautious groping for means of stabilizing the strategic balance may well turn out to be--in the full perspective of history--the most significant theme of the era.

Precisely because of its importance, however, the process of formulating and negotiating the first step toward formal strategic arms limitation--the SALT I treaty signed and ratified in 1972--cannot as yet be analyzed in complete detail. The diplomatic record is so directly pertinent to central questions of current policy, and access to it is so carefully restricted, that a historical review commensurate with other dimensions of this study could not be undertaken. Nonetheless, the events described in previous chapters do offer some important insight into the process of strategic arms control, and some aspects of the diplomatic record are available to provide a general context. This and published descriptions of the arms control negotiations provide a basis for comment.

The SALT I treaty formally limited the deployment of ABM systems in the United States and the Soviet Union to 2 sites of 100 launchers each; an associated protocol limited deployments of intercontinental-range offensive missile launchers to those under construction at the time of agreement. In addition, offensive force modernization was explicitly allowed on a unit-for-unit replacement basis, while a number of restrictions were placed on the further development of missile defense technology. The net effect was to weight the strategic balance contained in the treaty very heavily toward offensive capability. As for the mix of offensive forces, provisions allowed replacement of older ICBMs with SLBMs, but not the other way around; and a special sub-limit was placed on the "heavy" missiles of the Soviet forces. Both of these elements of the agreement served to encourage invulnerable systems suitable for retaliatory missions and to discourage systems more suited to hard target attacks. Though the purpose of these provisions was not articulated beyond a general statement of principles, a tacit logic was widely inferred since the arrangements very clearly reflected the requirements of mutual assured destruction as explicitly defined in the evolution of the U.S. strategic forces. Each side was apparently to be allowed a deterrent capability against the other, and threats to the offensive forces which embodied this capability were to be inhibited.

The major episodes in the development of the SALT I agreement have been recorded in public documents and published accounts.[1] A proposal along similar lines by the Johnson administration in 1968 stimulated serious Soviet interest. Formal negotiations were aborted by the crisis

in Czechoslovakia, however, and by the American elections. After redirecting the U.S. ABM program from defense of urban concentrations to defense of missile sites, the Nixon administration extended an offer of formal negotiations which led to the appointment of official delegations and the beginnings of SALT in November 1969. The asymmetries in the U.S. and Soviet strategic programs--in the orientation of the ABM systems, in the numbers and technical quality of offensive missile systems--produced many difficulties in the formal discussions which were resolved by special negotiations at the highest levels of both governments. A breakthrough occurred in April and May 1971 when both governments accepted the principle of simultaneous limits on ABM and offensive missile forces, excluding all bombers anywhere and tactical weapons deployed in Europe and the Far East. Details of these arrangements were then finally worked out at a summit conference in Moscow prior to the signing of the agreement.

Preceding chapters, particularly XI and XII, offer at least 3 important propositions relating to these basic facts. First, the process of negotiating a formal treaty was largely a matter of ratifying decisions on the size and basic technical composition of strategic forces which each side reached unilaterally well before formal negotiations began. Indeed, both governments appear to have developed serious interest in arms control agreements in the course of reaching political decisions on the size of their own strategic forces. Second, the process of accommodation has been strongly affected by the tacit principle that force programming decisions already established would not be reversed. Third, the political leaders in both countries were driven by the surge in

offensive missile technology to bypass a potentially attractive arms control arrangement between highly antagonistic powers--namely, provisions which would constrain offensive deployments in order to protect investments in defense. These propositions all have significant implications regarding both the degree of stabilization that has been achieved and some of the more likely sources of difficulty in future arms control discussions.

Ratifications of Unilaterally Established Constraints

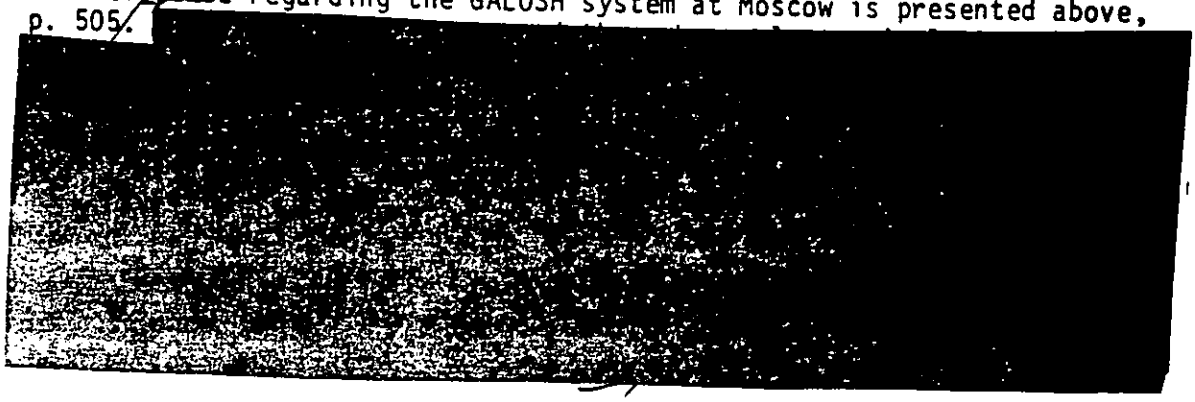
The two previous chapters present evidence that in both the United States and the Soviet Union the programming of strategic force deployments--that is, the final authorization by the highest levels of government*--occurred during a brief period of time substantially in reaction to crisis events. In both countries large increases in strategic missile forces occurred against a background of internal political resistance, and also in both the surge of the newly authorized deployment appears to have ended with internally imposed ceilings in place and predictable political resistance to deployments beyond the ceiling levels. For the U.S. program, the evidence is clear and direct. Fully authorized force levels established in the FY 1963 budget cycle became effective force ceilings by 1965 with the exception of the limited ABM deployment. For the Soviet Union, the evidence is more circumstantial, but it appears that by 1965 the Soviets too had authorized approximately the force levels which evolved over the

*Certainly in the United States, and very probably in the Soviet Union as well, plans for much larger deployments than actually occurred were generated by the military Services. These plans were not, however, final authoritative plans. In the United States, final authorization occurs when funds for deployment of a given weapon have been appropriated by Congress and obligational authority established in the DoD budget.

subsequent decade. Since construction on the Moscow ABM system was cut back in 1965, and since the SA-5 deployment after that date shows signs of reductions from a larger deployment plan, it is a reasonable surmise that Soviet force authorizations established in 1965 included restrictions on their ABM deployment very close to what was eventually formalized in the SALT agreement.* Both countries, of course, proceeded with programs for upgrading the technical performance of the deployed systems, and a substantial amount of retrofitting for that purpose has occurred continuously within the established ceilings.

These observations suggest that the basic political conditions for an agreement on the order of that which emerged in the SALT I treaty in 1972 existed after 1965. The Soviet leaders had apparently constrained their ABM system, and the Americans wanted to do so. The Soviets had programmed what they apparently thought to be a matching strategic deployment including provisions for MIRV technology, and the Americans had set politically solid ceilings on their overall force levels. The SALT I agreement in effect ratified the unilateral ceilings. Because both sides were committed to qualitative improvements via retrofitting, force modernizations were allowed.

*The evidence regarding the GALOSH system at Moscow is presented above, p. 505.



If this thesis is correct, then the interesting question is why it took so long to consummate the agreement. There are traces in the available diplomatic record which give at least some tentative answers to this question and thereby help to sustain the underlying thesis.

The diplomatic history of arms control discussion provides clear indication that serious concern about formalized strategic arms limitations began at about the same time that each government was struggling internally with the question of establishing ceilings on overall force deployment. The general issue of arms control was recognized and considered, of course, throughout the postwar period as discussed above in Chapter V, but it was not until the mid-1960s that the politically realistic formula of taking partial steps focusing exclusively on the strategic arms of the two principals was seriously introduced in high-level diplomatic exchanges. A flurry of such discussion involving President Johnson and his Soviet counterparts occurred from the time he became President until his inauguration to a full term in 1965.

On 21 January 1964, after a very general exchange of messages with Khrushchev, Johnson sent to the 18 Nation Disarmament Conference a special message which included a proposed freeze on strategic missiles and cutbacks in plutonium production.[2] The freeze was supported in subsequent months by extensive staff analysis within the U.S. Government designed to work out details. This exercise faltered on the verification problem--procedures sufficiently elaborate to answer the skepticism and professional caution of the Service chiefs were unacceptable diplomatically. It nonetheless served to document serious interest on the part of the President.

A high-level exchange of secret diplomatic correspondence on arms control continued despite the political demise of Khrushchev in October 1964, and up to February 1965 it averaged one major message per month.[3] In December 1964 Soviet Foreign Minister Gromyko, in communications to the President and Secretary of State Dean Rusk, cited "the arms race" as the first item on his list of specific problems affecting U.S. and Soviet relations under the new regime, and he explicitly advanced the principle of partial, limited arms control measures as a new and politically more promising approach to the problem.[4] Though it is possible, of course, to doubt the sincerity of the sentiments expressed in these diplomatic exchanges, the available record itself does not inspire such skepticism but suggests rather that the opposing leaders, though cautious and tentative, were seriously concerned by 1964 with the question of mutually agreed limits.

The high-level diplomatic exchange was broken off in 1965, obviously though not explicity by the intensification of the war in Vietnam. In February 1965 U.S. bombers attacked North Vietnam while Kosygin was visiting Hanoi. There were some direct indications that the incident had been a severe embarrassment to Kosygin,[5] and that is quite plausible from what is known of the internal debate in 1965 among the Soviet leadership during the preparation and approval of the 1966-70 Five-Year Plan. As noted in Chapter XII,* Kosygin apparently resisted the increase in military forces programmed into the plan, and the Hanoi incident could not have been very helpful to him. Though this event seems too ephemeral to have affected the outcome of force

*See above, p. 688.

structure decisions, it probably did affect the conduct of arms control policy. The flow of high-level messages on arms control halted entirely for a year and did not again resume on questions of strategic deployments until the U.S. initiative in January 1967 to seek a formal limitation on ABM deployments.[6]

The failure of the 1967 initiative to produce agreement can be ascribed to mistiming and misconception on the ABM question. The Soviets, perhaps relying on assurances given in the earlier diplomatic exchanges that the United States wanted them to take adequate time to formulate a position, did not appreciate the immediacy which technical developments, the force planning cycle, and domestic political pressures had given to the ABM question in the United States in the fall of 1966. Dobrynin was surprised by the urgency of it when consulted prior to Johnson's public appeal for negotiations in his budget message of January 1967.[7] American officials on the other hand did not understand the difficulty which the principle of ABM limitation presented to the Soviet leadership, given the partial and very imperfect deployment which they had scheduled. Quite apart from the complexities of imposing such stark constraint on the PVO,* there was a mismatch in basic logic. McNamara, as chief proponent in 1967 of an ABM limitation agreement on the U.S. side, saw the problem as one of instructing the Soviets in the logic of mutual assured destruction which he had evolved in the American context.[8] The Soviet leaders, on the other hand, particularly the official

*As noted in more detail in the supporting studies, the Soviet military structure located the strategic air defense mission in a separate service--PVO Strany. Its organizational stakes are much higher than the parent-Service of the U.S. ABM--the Army--whose primary focus and traditions are concerned with a very different mission.

contact at that point, Kosygin, while cognizant of McNamara's logic, still preferred a different principle, as noted in more detail below. Moreover, the Soviets were very resistant to the fact that the American position was based on an implicit threat--a competition in ABM deployment if limitations were not agreed upon in short order. The 6-month deadline which Johnson imposed was not realistic, and the formal U.S. decision announced in September preempted the Soviet internal discussions.

As recorded in the officially inspired account of SALT by John Newhouse, the discussion of strategic arms limitation resumed in 1968, and formal negotiations appeared to be imminent in the summer of that year when the Czech crisis intervened. After that, the schedule was further slipped by the American election and the transition to the Nixon administration.

It may be argued then that the highest political figures in the United States and the Soviet Union developed serious interest in formal arms limitations during 1964 and 1965 when each side was imposing overall limits on its own deployments, and that allowing for understandable delays in the process the agreement which emerged dates back to the discussions of that period. Bringing about a formal agreement took nearly as long as the actual construction of the weapon systems, but the available diplomatic record sustains the thesis that the fundamental political decisions came at the beginning. Though few if any could realize it at the time, the competition in basic strategic deployments had begun to stabilize by the mid-1960s. The intervention of marginally related crises, such as Vietnam and Czechoslovakia, and imperfect management of the negotiating process by both sides, could and did delay agreement; they did not prevent it.

Protection of Previous Decisions

A second characteristic of the SALT I agreement which becomes clear in historical retrospect is that with one exception its provisions were so constructed that the force structure decisions already established would not have to be reversed, including those decisions still to be implemented at the time of the agreement. This principle, which in the abstract is inherently simple and politically natural, was nonetheless only obscurely perceived in actual context; at least in the United States its implications were not clearly noted or readily accepted.

Dissatisfaction in the United States arose primarily because the testing and hence the definitive identification of the fourth generation Soviet missile systems--particularly the SS-16, -17, -18, -19, and later the SS-20--did not occur until after the signing of the agreement in 1972. These systems incorporated increases in missile throw-weight which the United States had pressed hard to preclude during the course of the negotiations. Though generally warned by the Soviet delegate, A.N. Shchukin, that there would be a replacement for the SS-9 and SS-11, which by implication would be larger,[9] U.S. officials nonetheless hoped to the contrary and gave political stature to their hopes by citing in congressional testimony and domestic debate the restriction incorporated into the treaty on increase in silo size.[10] The actual language of the treaty was ambiguous enough to cover the significant size increases incorporated in the fourth generation systems, but nonetheless an impression was created that the Soviet modernization program violated the spirit of the agreement.

This impression was strengthened because the testing of the Soviet fourth generation systems appeared to be delayed as compared with the cycle established for the second and third generation systems. For those previous missile programs, the first launches of test vehicles—from soft launch pads at the Tyuratam test center—corresponded in time to the beginning of construction of prototype silo sites at the center. For the SS-17, -18, and -19, however, full system testing began in the latter half of 1972 immediately following the signing of the agreement—after the field silo prototypes, which were begun in 1970, had been completed. This apparent delay in testing carried the suggestion of deception and further fueled recriminations in the United States over the provisions of the treaty.

The details of the fourth generation deployment presented in Chapter XII create a very different impression. R&D for these missile systems was very likely programmed in 1965, and in that case full system testing would not be expected to begin until 1972. Moreover, the [redacted] silos begun in 1970 are significantly different in length from those silos with the same designation which appeared later in the decade and were fitted with fourth generation systems. As discussed in Chapter XII, [redacted] silos begun in 1970 were fitted with an advanced version of the SS-11 rather than with a fourth generation system, and it is distinctly possible that the [redacted] silos as of that date were also originally scheduled for a system other than the SS-18s eventually placed there. Hence, [redacted] construction begun in 1970 may not be a valid reason to suppose that the SS-18 and SS-19 would normally have arrived at the same time.[11] A systematic attempt to

deceive would almost certainly have included a delay in the beginning of construction of new silo configurations because that in itself was a powerful sign of new systems emerging. Since all these sites were subjected to a substantial pause in construction beginning in 1971, one can infer that there was no compelling military requirement which would have prevented a delay in initiation of construction had deception been the intention.

Finally, tests of the first stage of the SS-18 with the cold launch sabot began in late 1971, well before the final stage of SALT I negotiations, U.S. analysts did not interpret those tests correctly at the time they occurred, [redacted] Shchukin's warnings, the readily observable silo construction, and the first stage tests are not consistent with a Soviet intention to deceive. Indeed, it would not have been outrageous on the part of Soviet leaders to assume that the United States knew perfectly well that they had committed themselves to a modernization program involving the deployment of multiple warhead systems, even that the [redacted] silo construction in the SS-9 and SS-11 fields, respectively, constituted an unambiguous signal.

It seems manifest, at any rate, that the Soviets did not have a well-prepared program waiting offstage for the moment that the SALT I agreement was signed. The disruption in the construction activities which began with the 1971 reprogramming lasted from 18 - 36 months and was obviously off of the normal force planning cycle. It seems apparent that the Soviets did not scheme to violate the spirit of the agreement but rather suffered considerable delay and inefficiency in adjusting to the sub-limit on large missile launchers, an idea introduced

in the formal negotiations which does not appear to have been present in the prior diplomatic exchanges. If the spirit of SALT I is understood as requiring the protection of prior strategic program commitments, it is this adjustment which constitutes the violation rather than the deployment of the fourth generation system. The question thus arises as to why the Soviets agreed to the large missile sub-limit.

An answer can be constructed from the pattern of the fourth generation deployment as it emerged after the agreement. As noted in Chapter XII, the SS-17 was deployed on an apparently advanced basis as a replacement for the SS-7 missiles which were still included in the operational forces, and the SS-18 then was restarted as a replacement for the SS-9. To this extent the adjusted plan constituted earlier modernization of the force than the original plan would have provided--i.e., earlier replacement of the SS-9 and it gave the Yangel design bureau an additional deployed system.* If the analysis in Chapter XII is correct, this more rapid modernization did not diminish coverage of the basic mission and hence would be attractive both to the system builders and to the strategic rocket forces, particularly if throw-weight is more significant to them in terms of range than in terms of warhead

*The extent to which the adjusted plan allowed earlier and more extensive modernization can be variously estimated. On the low side, it is possible that the replacement of the SS-9 by the SS-18 was also part of the original program and that the force programming adjustment in 1971 simply consisted of the removal of the incremental SS-18 deployment from the program. This interpretation would make the difference between the original and the adjusted plan smaller, but for that reason it would not explain why the original SS-18 deployment--the additional 20 silos--was stopped for over a year, or why there was such a notable change in the pace of the two phases of the program. On the high side, it is possible to infer from the evidence that none of the fourth generation systems were included in the original 1970 deployment plan and that the adjusted plan substantially advanced the schedules on which they were introduced to the operational forces.

loadings (the SS-17 can cover the entire United States). An adjustment of this sort which allowed the Soviets to meet the terms the United States demanded for the SALT I treaty and at the same time provided more capable forces than Soviet military planners had expected, could be attractive enough to motivate the reprogramming involved, particularly if the original plan had given prominent emphasis to multiple warhead systems for the purpose of demonstrating ABM penetration capability.

There may also have been another component of the Soviet internal adjustment, namely, a release of at least part of the SS-11 missiles previously assigned to peripheral missions for use in the central strategic balance. As noted in Chapter XII there is substantial evidence that [redacted] SS-11 launchers may have been assigned to targets on the Soviet periphery rather than to U.S. targets. Since the rules of SALT I count all SS-11 launchers in the central strategic balance, the Soviets could reprogram part of such a deployment to U.S. targets and remain perfectly consistent with the agreement. Such an internal arrangement would help explain Soviet insistence during the negotiations on a disparity in their favor of allowable numbers of missile launchers.

Since the SS-11 program clearly played a role in theater force modernization in the late 1960s, any deal to release part of this deployment for intercontinental missions would require future force programming for coverage of peripheral targets. It may well be that that is the intended role of the SS-20, [redacted] for deployment in a mobile arrangement to avoid silo basing. Deployment in silos would have contradicted the SALT I rules. It is the sort of program which might have been

improvised at the time of the 1971 reprogramming decisions to allow inclusion of more of the Soviet forces in the stabilized central balance for use against U.S. targets.

In general, with the Soviet adjustment to the SS-18 program as an explainable aberration, the SALT I treaty, understood in historical context, appears to have set a constraint on strategic deployments at the levels already established by political decisions at the time of agreement. This is a very significant achievement but one which has only a long-term effect on the evolution of strategic forces. Since the historical review suggests that the strategic deployments on both sides have not been incremental in character but rather have surged during concentrated periods of time in response to a complex set of factors, there is reason to believe that the basic force structures have been far more stable than has been discernible through the noise of short-term events. It is possible, of course, that the pressures created in both military systems by the imposed constraint might precipitate another surge of basic deployment decisions. Since the stabilization of the strategic offensive forces has occurred at such high levels of destructive capacity, however, it appears to be a tenable historical finding that both societies are now reaching an end to the quantitative growth of these forces.

This condition obviously does not hold for the defensive forces, and hence there is reason to look more carefully at that balance. In service of such an examination there is an additional historical observation which can be made.

Effects of Timing on the Substance of SALT

The central purpose of the SALT treaty was to impose sharp limits on ABM deployments in order to diminish incentives for further increases in the offensive forces. As noted, the underlying logic for such a program came from the concept of mutual assured destruction which, in effect, became a fundamental organizing principle for the U.S.-Soviet relationship.

On simple intuitive grounds, mutual assured destruction is not the preferred principle for strategic stability. In the abstract, strategic deployments dominated by defensive capability would provide an inherently safer strategic balance than off-setting offensive capabilities. As detailed in Chapter XI, reliance on the inferior principle became the focus of strategic policy because of inherent superiority of offensive technology, a superiority which appears to be indisputable under foreseeable technical conditions. That fact is nonetheless subject to an important historical qualification. The technical imbalance between offensive and defensive technology was not entirely inevitable. It is conceivable, had the process begun early enough, that strategic stabilization could have been advanced by constraining offensive technology and emphasizing defensive systems rather than the other way around.

The actual outcome was significantly affected by the historical sequence wherein offensive weapon systems were developed more rapidly than defensive technology and were authoritatively scheduled for extensive deployment before questions of arms control were seriously

addressed. In the United States, the principle of incorporating formally agreed but partial limitations on strategic deployments as a central element of national defense policy was not seriously raised at authoritative political levels until MIRVed systems had been established in the weapon development plans. The SALT I treaty was not signed until the deployment of those systems on a substantial scale had become irrevocable. Methods for constraining MIRV technology by limiting flight test programs were not developed until actual deployment was well advanced. The MINUTEMAN III and POSEIDON systems concretely embodied sufficiently compelling superiority over ABM technology of the same era to provide an analytic basis for resistance to any ABM deployment at all, and a fortiori this precluded primary reliance on a defensive deployment at anything like the force levels then programmed.

Had it been possible, however, to incorporate strategic arms control as an element of defense policy at the time of Sputnik, a program designed to constrain offensive technology while driving marginal investments into the development of strategic defense might well have been possible. As discussed above,* a nascent Army/Navy coalition favored a limited deterrent force and presumably would have been strengthened by such a posture. The flow of financial resources, scientific attention, and industrial support concomitant with a priority ABM effort would have strengthened the Army institutionally, and the logical corollary of stronger conventional forces would potentially

*See pp. 454-56.

have had broad appeal throughout the military establishment. Even SAC, given its commitment to bomber operations, might not have rebelled with full force against such a policy if advanced bomber development had been allowed. Had binding constraints been imposed on offensive systems, the scientific community could have been harnessed to the ABM problem with much less dissent, particularly since this would have played to inherent American advantages in radar and computer technology. Technically and militarily, then, this choice appears to have been possible in 1958. The opportunity was swept aside because it would have required a much greater political accommodation than either the Soviet Union or the United States was prepared to contemplate. By the time serious reliance on arms control measures became politically imaginable, technical and institutional commitments to offensive capability precluded stabilization based on defensive technology.

The resolution of this issue within the Soviet Union is unfortunately a question all but overwhelmed by the uncertainty surrounding Soviet decision processes, but it is not likely that the Soviets adopted a strategic posture dominated by offensive systems as readily as did the United States. As discussed in Chapter XII,* there is a serious possibility that the hope of constraining intercontinental offensive systems at a low level by some form of agreement may have been an element of Khrushchev's posture in the period 1958-60. That could have been an element in his calculations when he blatantly exaggerated the pace of Soviet ICBM production while cutting back the deployment program, and

*See above, pp. 678-79.

the diplomatic demarche to the Eisenhower administration which he undertook at the same time might have been conceived as a probe of U.S. responsiveness to mutual constraints. Given the relatively heavy IRBM and MRBM deployment committed in the same period, such a position would have given the Soviets strong offensive capabilities in the peripheral theaters--Western Europe and the Far East--and with those forces in place an intercontinental force balance led by strategic defense would have encouraged the gradual disengagement of U.S. strategic forces from these theaters--long supposed to be a major Soviet desire. If this is in fact what Khrushchev had in mind, he was nonetheless not prepared to adopt the very accommodating political posture which such a program would have required to get any serious hearing in the West.

Accepting that the Soviet ICBM and SLBM deployments were tracking those of the United States after 1962, it is unlikely that during the rest of their critical planning phase--1962-65--the Soviet leadership formulated a serious option for a defensively dominated strategic force structure based on offensive force constraints. Nonetheless, there is evidence that Kosygin at least was very much concerned with this principle when the diplomatic contacts which led to SALT were started. He was clearly irritated by frequent suggestions that the Soviets were having difficulty comprehending McNamara's argument, and he took the occasion of a visit with Prime Minister Harold Wilson in London in February 1967 to outline his views. According to British records of the conversation, he made it clear that he fully understood the American argument that a deployment of defensive systems by one side would stimulate the other

to increase offensive deployments and that such offensive force increases would be cheaper. He labeled that argument "obscurantism and misanthropy." Any child, he insisted, knew it was easier to buy offensive rather than defensive weapons; "what kind of philosophy was it that concerned itself with killing people in the cheapest possible way?" If all countries could perfect defensive antimissile systems, he noted, mankind could live in peace because nuclear war would have been neutralized.[12]

No amount of eloquence, of course, can redirect the course of history. Moreover, even from a completely compelling historical argument that the timing of strategic developments did indeed turn both countries away from a course for strategic arms stabilization based on defensive rather than offensive technology, it would not follow that the process could be reversed and foregone possibilities recaptured. Nonetheless, such speculation about alternative paths which strategic developments might have taken is not a matter of idle curiosity. The important point is that all along there have been strong counterthemes to the conception of balanced offensive capability, which has emerged as the dominant construction of the U.S.-U.S.S.R. strategic relationship. It is quite conceivable that future technical developments, not of themselves decisive, could interact with these underlying factors to generate significant pressures for a substantial shift in favor of strategic defense. Should this occur, it would not necessarily reflect a deliberately constructed threat to world stability which the current logic of arms limitation would naturally interpret it to be.

CHAPTER XIV

SUMMARY AND CONCLUSIONS

Historical Summary

The strategic arms competition between the United States and the Soviet Union originated in the first few years of the Cold War after World War II. On neither side was this initial phase marked by systematic consideration of the military aspects of political rivalry or the potential effects of new technologies.

U.S. Postwar Policy Shift

On the American side, the years 1945 to 1948 brought near consensus that the Soviet Union was bent on world domination. The successful Communist takeover in Czechoslovakia in February 1948 and the Berlin blockade beginning in June 1948 ended almost all dissent from this view.

Until the outbreak of the Korean War in mid-1950, the Truman administration emphasized economic aid, primarily but not exclusively for Europe, to improve conditions and thus lessen the political appeal of communism. Military forces scarcely figured in early efforts to contain Soviet influence. Pursuing demobilization, reorganization, efforts to establish universal military training, civilian control of the national atomic energy program, and proposals for international control of nuclear weapons, the Administration gave little thought to the possibility of actual war with the Soviet Union. In April 1947--a month after

proclamation of the Truman Doctrine--the President learned from the Chairman of the new Atomic Energy Commission that the United States had no atomic bombs available for combat use.

U.S. Reliance on Strategic Nuclear Weapons

After mid-1948, as military policy received increased attention, two convergent factors contributed to a developing consensus in favor of primary reliance on strategic nuclear weapons. First, the United States had emerged from World War II with a working doctrine of strategic offensive warfare and an experienced bomber force. The latter, together with holdover naval power centered on carrier forces, constituted most of the military strength surviving the rapid postwar demobilization. Strategic bombing seemed almost the only type of operation which the United States could conduct against the U.S.S.R. without putting itself on a permanent war footing or remobilizing.

Secondly, the United States alone had the atomic bomb, which was widely thought to be an "absolute weapon." Although experts cautioned that the American monopoly could not last long, few people even in the military establishment gave serious thought to the time beyond.

NSC 20/4 of 1948 stated that the threat of strategic nuclear attack would deter the Soviet Union from capitalizing on advantages in conventional military strength. In 1949, through the North Atlantic Treaty, the United States committed itself to defense of Europe without planning

at the time to maintain other than occupation troops in the European theater.

The tendency toward primary reliance on strategic nuclear forces received further impetus from the Berlin blockade crisis, for the Russians plainly possessed local superiority. Almost the only U.S. military gesture available was the transfer of B-29s to forward bases, but these planes were not actually capable of delivering atomic bombs, for no preparations had been made to transfer bomb components and assembly teams to forward areas within reach of Soviet cities. Officials in Washington concluded that first priority should go to ensuring the readiness of the strategic bomber force in case a showdown should come in Berlin or elsewhere. Budgets for fiscal years 1950 and 1951, designed to keep defense spending under rigid ceilings, pared less from strategic air forces than from any other element of the military establishment.

Discovery in September 1949 that the period of nuclear monopoly was over did not shake the consensus on the primacy of strategic offensive forces. In part, this was because of advances in military technology. In the earliest postwar years, it had appeared that the inventory of atomic bombs would always be small and that the bombs themselves would be cumbersome and inaccurate, suitable for delivery mainly by large, specially adapted Air Force bombers. By 1950 it became evident that fission weapons of widely varying size and yield

could be had in large quantities, broadening the options for SAC and facilitating efforts by both the Navy and Army to acquire nuclear weapons of their own and to secure a say in the strategic offensive mission. In addition to design and production changes suggesting that there could be a plentiful stock of fission weapons to meet future Service requirements, there was also a prospect of being able to develop immensely more powerful weapons, including ones whose power derived from thermonuclear or fusion reaction.

The question of whether or not the United States should try to develop the hydrogen bomb became an especially sharp issue within the government and its circle of scientific advisors following the first Soviet atomic detonation in August 1949. One group including J. Robert Oppenheimer and AEC Chairman David Lilienthal opposed development, arguing that the United States should not initiate competition in the development of high-yield weapons. A number of officials in the Pentagon and the State Department--advised by physicist Edward Teller, among others, that a hydrogen bomb was scientifically feasible--took the position that the United States could not afford the risk of allowing the Russians to gain an apparent lead. Out of this issue, resolved by President Truman in January 1950 in favor of development of the hydrogen bomb, also emerged a comprehensive review of America's policy objectives and military posture and the new postwar international environment.

Undertaken by a special committee whose leading member was Paul Nitze, Director of State's Planning Staff, the review produced NSC 68, which recommended that there be an overall increase in U.S. military strength, and that in the nuclear field the United States should maintain superiority. The cost implications of these recommendations clearly ran counter to the $12.5 billion ceiling on the defense budget which the President had ordered and which officials such as Secretary of Defense Louis Johnson and Budget Director Frank Pace were assiduously maintaining. The President therefore withheld final approval of NSC 68 pending study of the probable costs. Commenced in April 1950, this cost study was still underway when, 2 months later, the Korean War broke out.

Up to the time of the Korean War, U.S. strategic forces were little affected by competition with the Soviet Union. Though defense budgets were far larger than before 1940, the chief reason was a widely shared belief that the United States had in the past spent too little on preparedness. No pretense could be made of preserving the balanced ready forces called for in general Presidential and congressional declarations concerning defense policy. Though the case for long-range bomber forces seemed to be bolstered by the Cold War, SAC's share of these stringent budgets might have been much the same without it, for long-range bombers would have received priority in the Air Force for the same reason that carriers received priority in the Navy -- because the champions of those particular systems dominated the two Services. Even for as late a date

as mid-1950, it is hard to say how the U.S. military establishment would have been different if U.S.-Soviet relations had been comparatively amicable.

Soviet Defense Policy Approach in the Early Postwar Years

The Soviet Union entered the postwar era facing problems quite unlike those of the United States. It had lost 20 million people and suffered near-devastation in its most populous and industrially developed regions. It had on its frontiers and even within its own borders hostile populations not easily kept under control, made to contribute to restoration of the Soviet economy, or educated to participate in achieving the aims of communism. It confronted as a presumptive rival in Europe and elsewhere the most powerful state in the history of the world--one which openly renounced its previous self-imposed isolation and proclaimed its concern with the internal as well as external policies of nations in all parts of the world, one uniquely possessing atomic weapons and beyond the current reach of Soviet military power.

The Soviet Union entered the postwar era also with a military establishment and a government different in significant respects from those of the great transoceanic rival. Its military forces and traditions derived from centuries of preoccupation with land warfare in comparitively open spaces. It had virtually no forces or doctrine for strategic warfare as understood in the West. Its government was not only a

dictatorship committed to a revolutionary ideology but a government almost unique in its longevity and experience. Elsewhere in the world, the leadership was new. Few high officials of the Truman administration were even survivors of the New Deal. Britain repudiated the generation of Munich. The Soviet Union, on the other hand, despite all the turnover resulting from various purges, still had at the top men who had exercised power continuously since the 1920s.

When the fourth Five-Year Plan covering the years 1946-50 was drawn up for Stalin's approval in the latter half of 1945, several basic considerations affected the defense components. These included both a vast demand for resources for reconstruction plus an obvious need to reduce war-inflated military forces and a compelling requirement to maintain a military posture adequate to underwrite postwar Soviet political claims and to discourage the West from exploiting unrest in Eastern Europe. There was also the challenging task of piloting the Soviet Union through a danger-strewn phase of nuclear vulnerability while making an effort to whittle down the Western advantage in such fields of advanced technology as nuclear weapons, electronics, and jet propulsion.

In the Soviet decision-making system, one lending itself to highly centralized direction, Stalin appears to have had a direct hand in virtually all defense policy and program decisions. Some appear, however, to have involved considerable high-level debate.

The visible results of these decisions included a number of developments, especially major demobilization of the armed forces, from more than 11 million men to somewhere between 3 and 4 million in 1948, plus perhaps half a million border and security troops. The ground forces, though substantially reduced in size, stood to gain in mobility and striking power through programs for improved armor and artillery. Development of jet aircraft for both tactical and air defense forces was accelerated, aided initially by acquisition of British engine technology, while buildup of a bomber force capable of strategic operations around the Eurasian periphery proceeded on the basis of large-scale production of the TU-4 piston bomber copied from the American B-29. More than 1,800 TU-4s were produced. As early as July 1945 Stalin declared publicly that the Soviet Union would build a strong fleet; postwar programs included several new classes of surface ships and diesel-submarines, along with expansion of shipyard capacity.

Concurrently, R&D programs of very high priority went ahead at Stalin's direction to develop nuclear weapons and aerodynamic and ballistic missiles. Initiated as early as 1942-43, the Soviet program to develop an atomic bomb accelerated after 1945. The Soviet Union successfully tested an atomic device in August 1949, several years ahead of most Western estimates.

By 1947, a high-level coordinating group to monitor missile development had been formed, and two parallel projects were underway--

one at research and test facilities set up at Kapustin Yar and manned chiefly by Soviet personnel, and the other at Sukhumi, manned largely by Germans. Out of these projects grew such relatively short-range missile systems as the SS-2 and SS-3, first tested in the early 1950s. The latter was to become the Soviet Union's first deployed MRBM system.

A Soviet decision to develop an ICBM system capable of hitting targets in the United States was apparently made around 1948-49, even before range testing of precursor MRBM systems had begun. As compared with their American counterparts at the time, the Soviets seemed to show greater confidence in the feasibility of developing intercontinental ballistic missiles. Even though their total resources were much smaller, they made a larger absolute investment in ICBM development than did the United States, which did not have an ICBM program between 1947 and 1951. Part of the explanation may be that artillerists in the Soviet Union, like bomber pilots in the United States, tended to be less skeptical than others about the possibility of extending vastly the accurate range of their weapons. Also, the Soviets may have had higher confidence than Americans that nuclear and even thermonuclear devices could be packaged in missile warheads, for in the Soviet Union theoretical work by scientists often ran far ahead of engineering technology, and Soviet political leaders were already accustomed to basing decisions on what scientists said would eventually prove feasible.

The early Soviet start in long-range missilery is particularly

interesting here because it probably cannot be explained as prompted by any U.S. ICBM initiative since the United States had already suspended work on an ICBM. The Russians could have felt that they were racing the Americans if they believed that a clandestine ICBM program existed. Of more immediate consequence, certainly,was the threat of the U.S. bomber force.

This instance highlights the importance of mind-set as a factor to be considered in any analysis of the strategic arms competition. Soviet artillerists would have pressed ahead toward an ICBM, one can assume, until faced with indisputable evidence of its infeasibility--as American airmen did, in fact, pursue to, if not beyond, the point of implausibility the concept of a nuclear-powered bomber. On the other hand, the United States was not prompted to devote scarce resources to ICBM development even when possessing intelligence concerning Soviet MRBM and ICBM programs. In part, this may have been because of the basic preference of American officers concerned with strategic warfare for bombers over missiles and the prevailing belief that long-range strategic missiles were still a long way off. A curious disconnection between the two sides until the mid-1950s, when the American mind-set began to alter.

Notwithstanding Stalin's emphasis on modernization of the Soviet military establishment, military doctrine seemed to remain unchanged.

Rather than exploring the military and political significance of nuclear weapons and the potentially disastrous consequences of a surprise nuclear attack, Soviet texts continued to assert that the Soviet Union's large conventional forces, together with the communist system's alleged advantage in political morale, would ensure the defeat of any "imperialist aggressor."

By and large, Stalin's postwar defense policy seems a product, not of any single comprehensive rationale, but of multiple considerations, not all of which necessarily involved a consistent logic. To some extent, for example, Stalin's policy might be explained as a phased response to what were seen as likely demands on Soviet military forces, including possible military contingencies in the near future arising out of occupation arrangements or aid to revolutionary movements, but no real military threat anywhere on the short-term horizon. In these circumstances, forces ample to maintain Soviet military dominance around the Eurasian periphery could suffice, while R&D and shipyard and plant construction provided a basis for the military power that might be required later either to defend against capitalist-materialist aggression or to take advantage of some large opportunity created by new contradictions in the capitalist-imperialist world comparable to those which had set the bourgeois states and the fascists against one another in 1939.

A second possibility is that Stalin conceived of the postwar Soviet

military extablishment less as a force to be readied for any actual military contingencies than as one intended to influence Western perceptions. Fearful lest the West attempt to deprive the Soviets of their wartime political gains or otherwise exploit weaknesses due to Russian losses in the war or Russian backwardness, Stalin could have had high among his objectives the creation of an illusion of military power sufficient to inspire caution among bourgeois leaders. Such an illusion could also have uses if communists came to power somewhere outside the existing Soviet sphere and bourgeois states debated counterrevolutionary intervention in uncertainty as to the possible Soviet response. Such a hypothesis would help to explain disproportionately heavy investment in the TU-4,which provided the Soviets with an immediate capability for posing a threat to Western Europe and the United Kingdom.

Another explanation of Stalin's defense policy is that it might have reflected primarily his domestic concerns, especially that of restoring and preserving his dictatorship in a postwar environment in which national discipline needed for reconstruction could be strained by competition for scarce resources between civilian and military sectors of society. Under this hypothesis, the reorganization of governmental bodies concerned with defense, the shifting of top personnel, and the budgetary slices decreed by Stalin derived as much from desire on the part of Stalin to avoid giving much power to any other individual

or to any organization as from any strictly military or foreign policy considerations.

Whatever may have been the combination of factors helping to shape Stalin's initial postwar military policy, it is evident that--as with the United States--a shift of sorts occurred in and after 1948. When Yugoslavia defected in 1948, the Soviet government found itself impotent. If Stalin's military policies had had the objective of preparing for actual contingencies, they had failed. From the Soviet vantage point, it must have seemed that the affair markedly reduced the credibility of any Russian military threat outside its own sphere. And, as evidenced by new purges throughout the bloc, it added to Stalin's fear of dissent.

There occurred in short order the issuance in the United States of the Finletter and Brewster reports calling for stronger strategic forces, a modest increase in U.S. defense spending, the crisis associated with the Berlin blockade, and the first moves toward formation of NATO and the inclusion of Western Germany in an anti-Soviet alliance. Though a new 5-year plan was not to take effect until 1950, the Soviet government instituted major defense program shifts, involving temporary enlargement of the ground forces, together with acceleration of their modernization, autonomy for PVO Strany, shifts in the aircraft industry preparatory to forced-pace introduction of new bombers and fighters, and allocation of new resources to radar and SAM development. All these moves seemed indicative of an effort to provide a real basis for

capitalist-imperialist leaders to conclude that the Soviet Union could successfully wage offensive or defensive warfare in adjacent theaters, conduct strategic artillery or air operations against almost any targets in Europe or Asia, including U.S. aircraft carriers and forward bases, and at least cause heavy losses to enemy strategic bombers attacking the Soviet homeland. Stalin's pressures for faster work on an intercontinental bomber, together with allocations for ICBM R&D, speak of eagerness also to have on hand some strategic offensive force which Americans might see as posing a threat to their cities offsetting the threat to Russian cities posed by SAC.

Most of the effects of these changes in policy were not to become visible for years, and they were still not accompanied by any apparent alterations in Soviet military doctrine. To some extent, however, the formal doctrine that was to develop in debates following Stalin's death was prefigured in the force posture ordained by decisions of 1948-50. Although it is not clear that many Soviet leaders, military or civilian, had begun to understand how warfare might be affected by nuclear tecnology, it does appear that concern had arisen about the possible effects of enemy strategic operations. Soviet military forces were being reshaped to fight a war in which the homeland could be subjected to devastating attack, not across land as in the past, but through the air. They were also being rehsaped as if one of their major missions would be to limit damage to Soviet forces by striking at enemy strategic offensive forces before they could reach Soviet targets.

While alterations in American strategic posture during this period were largely reactions to Soviet political moves, the still more significant alterations in Soviet strategic posture seem to have been provoked chiefly by events within the Soviet sphere. And it should be noted that the apparent Soviet turn toward development of war-fighting and damage-limiting forces took place before, not after, the Korean War and the consequent buildup of U.S. military strength.

To make these assertions is not to point a finger at the Soviets as initiators in the strategic arms competition, but to stress that important developments on both sides were affected from the outset -- even in a period of almost complete bipolarity -- by events the perceptions of which by one party were virtually beyond being influenced by the other party. Almost no action by the United States could have lessened the effects on Russia of the Yugoslav defection. Although the Soviet Union could probably have prevented the North Korean attack on South Korea, its leaders clearly did not foresee and certainly could not have regulated the response of the United States--a response which included an enormous enlargement of capacity for strategic nuclear offensive operations.

Initial U.S. Strategic Buildup Under the Stimulus of the Korean War

Coming less than a year after such developments as Soviet attainment of nuclear status and the establishment of a Communist regime in mainland

China, the North Korean attack on South Korea in June 1950 was widely interpreted in Europe and the United States as having been instigated by the Soviet Union as part of a new expansionist surge that not only could threaten the security of Western Europe but that might also for the first time pose a nuclear threat to the continental United States itself.

Certain that the North Korean attack was a calculated test of Western will and resolution, President Truman not only committed U.S. forces to resist and repel the Korean aggression but abandoned entirely his previous insistence on limiting defense spending. He proposed to Congress, in effect, that it appropriate for the military Services whatever they estimated to be necessary for matching military capabilities to the policies outlined in NSC 68. Congress cooperated by boosting the FY 1951 defense budget more than three-fold from $13.6 to $48.3 billion. Through the winter and spring of 1950-51 marked by Chinese intervention in Korea, setbacks for American forces, Truman's firing of General Douglas MacArthur, and a great debate over European policy prompted by the President's announcement that 4 U.S. divisions would be assigned to NATO, the Administration and Congress continued to be openhanded in dealing with requests from the Services.

Recognizing that this could not last, Secretary of Defense Robert Lovett and others in the Pentagon followed a deliberate policy of funding procurement of future weapon systems. The defense budget

(TOA) for FY 1952 was $62.7 billion (including military assistance program funds), which amounted to $186.8 billion in constant FY 1976 dollars and remained the largest post-World War II defense budget thereafter. In the mid-1950s, the economy-minded Eisenhower administration was to find to its distress that executive and congressional actions of the Korean War era obligated it to lay out annually on defense many billions which it would have preferred not to be spending. As it turned out, the Korean conflict put an end to any lingering possibility that the United States might return to its prewar tradition of small peacetime forces and budgets.

Apart from immediate support of the U.S. forces mobilized for action in Korea, the outlays from 1950 to 1953 funded primarily efforts to transform NATO into a credible military alliance and to expand U.S. strategic nuclear forces.

Planning for NATO focused on preparation for a "year of maximum danger" in 1954. The logic was that the Soviets would see the West rearming, recognize that the advantage accruing from their superior numbers was rapidly diminishing, and be tempted to act before that advantage disappeared entirely. The year 1954 was chosen somewhat arbitrarily as the estimated point at which the balance would begin to tip toward the West. It also served to facilitate force planning during a period of rapid growth.

The most noteworthy practical steps toward strengthening NATO were the President's commitment late in 1950 to station American troops in Europe, at least until European forces had been enlarged and re-equipped, and the designation of General Eisenhower as commander of all NATO forces. These measures were followed in 1952 by the working out of terms intended to provide for West German participation in NATO defense arrangements. However, even arguments about the "year of maximum danger" could not initially overcome internal alliance objections, particularly from France, to West Germany's entry into NATO, which was held up until 1955.

In the buildup of U.S. strategic forces initiated during the 1950-53 Korean War period, the main emphasis went to expansion and modernization of the SAC bomber force, though free-flowing funds also financed, along with an authorized increase from 7 to 12 modern aircraft carriers, the development of carrier-borne bombers such as the A3D, and the development of nuclear-armed fighter-bombers, rockets, and artillery, the power of which called into question some of the theoretical distinctions between tactical and strategic weaponry.

The SAC programs at the heart of the strategic buildup included large-scale procurement of the B-47 medium jet bomber, of which the first operational version became available in 1951, and those aimed at improvement of SAC's capabilities by providing tanker and escort-fighter support and a network of forward overseas bases for staging

and refueling. At the same time, development of the B-52 heavy bomber, which had been initiated in 1946, was speeded up. As a result, this bomber, whose range was expected ultimately to reduce SAC's dependence on forward bases, came into production ahead of schedule in 1954, and first entered operational service a year later.

Parallelling the growth in numbers of strategic delivery systems came a notable increase in the size and variety of the nuclear stockpile. The effort to develop a thermonuclear weapon also turned out to be successful, and following the test of a 10 MT "dry" device in October-November 1952, it became evident not only that thermonuclear warheads could be built, but that they, too, could be packaged in small containers.

In early 1953, the JCS directed that targets for the mushrooming U.S. nuclear arsenal be in three categories: BRAVO (affecting Soviet ability to wage a nuclear strike against the United States); DELTA (reducing Soviet war production capacity); and ROMEO (retarding the theater advance of Soviet military forces). Although SAC did not want to use strategic nuclear resources against the essentially "tactical" targets of the ROMEO category, it yielded to the extent of allocating for theater purposes enough weapons to make it seem unnecessary for Tactical Air Command or Navy aircraft to be enlisted by theater commanders for major nuclear delivery missions In practice, this did not prevent TAC (in 1952), the Navy, and the Army's artillerists

from developing ample capability for ROMEO missions. In 1960, when, at the insistence of Secretary of Defense Thomas Gates, the Services reluctantly agreed on joint targeting, it became evident that each Service had equipped itself for its own nuclear war with the Soviet Union.

The "New Look" U.S. Military Posture Under Eisenhower

When Eisenhower entered office in early 1953 he brought to the Presidency two strong convictions somewhat in conflict: The first, that defense of Europe was vital to U.S. security; the second, that government spending, including defense, must be reduced. With the ending of the Korean conflict in mid-1953, the new Eisenhower administration was in a position to seek a military posture that would reconcile these twin concerns.

What emerged was the so-called "New Look." Linked with the "massive retaliation" doctrine set forth by Secretary of State Dulles in January 1954, the New Look involved cutting back general purpose forces, especially the Army's manpower-intensive force structure, in favor of strategic forces, but at the same time putting brakes on the latter by stretching out the buildup. Though a stretch-out had already commenced, the Eisenhower administration announced publicly its abandonment of the "year of maximum danger" concept in favor of preparation for "the long haul." One important concept of the New Look was that

nuclear weapons were no longer to be regarded as distinct from conventional weapons. The armed Services were to plan on having nuclear firepower in any type of war. As applied to Europe, where not even a contemplated German contribution of 12 divisions promised to remedy the shortfall in meeting NATO's conventional force goals, the New Look involved a major revision of NATO strategy in December 1954, with plans made for U.S. -controlled tactical atomic weapons to offset the Soviet Union's assumed superiority in troop strength.

Although the Eisenhower administration effected economies, giving the Services in fiscal years 1954 and 1955 funds almost 20 percent below their requests, it felt continuing and increasing pressures to raise its ceilings. Some came as a result of world events; some from new though often inclusive intelligence on Soviet military programs; some from advances in both Soviet and U.S. technology.

The wisdom of the New Look came into question when the United States faced crises or near crises in Indochina in 1954 and in the Formosa Straits in 1954-55. With some congressional support, Army leaders protested that strategic nuclear strength was almost useless in such situations and that more funds should go to general purpose forces. Meanwhile, however, the adequacy of allocation for strategic forces also came under challenge when the Soviets staged public flights over Moscow of new heavy bombers, the Bison in 1954 and the Bear in 1955. Occurring 2 years sooner than expected, these fly-bys suggested a crash program cutting development lead time to about

5 years (compared with almost 8 years for the U.S. B-52). Estimating that production would reach 15 to 20 bombers per month, Air Force officials and their supporters in the press and Congress warned that the Soviet Union could have 350 Bison and 250 Bear bombers by mid-1959, while the United States would have only 500 B-52s. A "bomber gap" would open up unless remedial measures were taken.

Almost simultaneous with this cry came advice from scientists in favor of urgent investment in long-range missiles. In February 1954, both a Rand study group and the Strategic Missiles Evaluation Committee, headed by John von Neumann, reported independently to the Air Force, but with similar conclusions, that, on the basis of breakthroughs in thermonuclear technology first foreshadowed in the IVY test series in 1952 and later confirmed by the CASTLE series in the spring of 1954, warhead weight requirements had been reduced sufficiently to make feasible the development of an operational ICBM by the end of the decade.

Spurred by these reports, the top civilian and military leaders of the Air Force agreed in May 1954 to give the ATLAS highest priority among USAF development projects. Despite SAC's expressed preference for a nuclear bomber, in July 1954 the Air Force made development of an operational ATLAS at the earliest possible date the responsibility of a newly created organization (the Western Development Division) under then-Brig. Gen. Bernard A. Schriever. The Air Force also initiated programs for the TITAN and THOR in 1955.

Setting up its own Army Ballistic Missile Agency early in 1956 under Maj. Gen. John B. Medaris, the Army pushed work on a JUPITER IRBM program, originally to be shared with the Navy, which hoped to develop a ship-launched version of this liquid-fueled missile.

Allegations that a "bomber gap" impended and that a "missile gap" might open up highlighted the fact that technological developments were tearing away the historic near-invulnerability of the U.S. homeland. During the Truman period, relatively little had been invested in strategic defense. Though the Air Force had established an Air Defense Command and enlarged and modernized its interceptor force, and though agreement had been reached with Canada for joint construction of the Pinetree radar warning line, strategic defense had also been taken most seriously by the Army, the Service least able to afford expensive R&D. As of the beginning of the Eisenhower administration, the Army had begun to substitute NIKE-AJAX surface-to-air missiles for antiaircraft guns, but it had done little more than commence study of the complex problems associated with defense against missiles.

In February 1955, the Killian Committee advised the NSC that, owing to Soviet progress in bombers and missiles, the United States should give high priority to enlarging and modernizing its own bomber force, developing an ICBM, erecting defenses for protection during the 1950s, and pursuing work on an ABM. In November 1957, after 2 intervening

years marked by crises in the Middle East and Europe, culminating in the shock of the Soviet Sputnik shots, the Gaither Committee presented a report to the President which argued that greatly accelerated buildup of strategic offensive and defensive forces was imperative if the United States were to survive.

Almost all the recommended courses of action during these years involved spending at levels which Eisenhower and his advisers regarded as intolerable. They yielded almost not at all to Army Chief of Staff General Matthew B. Ridgway and others asking increases in general purpose forces. Instead, they adhered to a strategy based on the assumption that the Soviets would be deterred from attacking Europe or other peripheral areas primarily because of fear that the United States would respond by launching a strategic nuclear offensive. They also yielded little to clamor for programs which would, limit damage to the United States in the event of a nuclear exchange. After much study and debate, the Administration decided that US strategic defensive forces should exist primarily to protect the strategic offensive forces which, even after an enemy surprise attack, must remain able to effect devastating retaliation. In 1956, the Administration did reluctantly double the monthly rate of output of B-52s, establishing a new goal of having 600 B-52s plus 400 KC-135 tankers. In the spring of 1957, when presented with evidence that Soviet bomber production was below anticipated levels, the output rate was reduced.

Meanwhile, the President had ruled in September 1955 that development of an ICBM should have high priority as a national program.

Army and Navy arguments that IRBM development was equally important influenced the President, in December 1955, to give equal priority to the IRBM. Some questions about responsibility for IRBM operations remained unresolved. Because of urgent production and deployment requirements and because the thermonuclear warhead permitted relaxation of requirements for accuracy, the prospective missile force was conceived as having primarily the mission of destroying enemy cities and industrial concentrations. It was not envisioned as able to assume a damage-limiting counterforce mission. The United States thus wedded itself in the 1950s to the doctrine that its strategic forces should have the paramount function of assuring that substantial destruction could be visited on the USSR, no matter what the Soviets did with their own strategic forces.

Evolution of the Soviet Strategic Posture in the 1950s

Beginning in 1948, the Soviet government had enlarged its ground forces and production of IL-28 light bombers and MIG-15 and MIG-17 fighters, most of the former and 40 percent of the latter going to support the augmented ground forces, the remaining 60 percent of the MIGs going to PVO and strategic air defense. These program changes seemed keyed to preparation for war that might break out in the near future.

Despite the Korean conflict and the vast American buildup, or perhaps partly because of the restraint shown by the United States in Korea and the fact that neither the United States nor its allies developed the general purpose forces projected in early NATO planning, the Soviet Union once again made major alterations in its defense programs. Ground forces were reduced in numbers, and the absolute amount of airframe capacity devoted to military production diminished. Meanwhile, projected naval surface ship and diesel submarine production was cut back sharply. Coming just when U.S. strategic forces were expanding and beginning literally to encircle the U.S.S.R., Soviet military retrenchment in 1951-53 seems most probably to have evidenced a return to an assumption that a major war would not develop within the near future. Except for PVO Strany, which continued to receive maximum numbers of new jet interceptors, resources seemed to be channeled away from ready forces and into development of new long-range bombers, long-range land-based missiles, and submarine-launched ballistic missiles.

Following Stalin's death in March 1953, the collective leadership that succeeded him saw fit to expedite a negotiated settlement of the Korean conflict. During the next year or two of internal leadership transition, however, little more than marginal adjustments were made in defense programs under way. Khrushchev's emergence in 1955 as the dominant figure in the Soviet leadership coincided with drafting of

the sixth Five-Year-Plan, and his stamp soon appeared on Soviet military policies.

One of Khrushchev's major problems was to counter the growth of NATO, whose military potential in Europe began to appear in a new light with such developments as adoption of a theater nuclear strategy in December 1954 and the inclusion of West Germany in May 1955. Part of the Soviet response was the creation of the Warsaw Pact on 15 May 1955, marking the formal emergence of opposing military alliance systems in postwar Europe. However, this was at the time essentially a diplomatic countermeasure that contributed little to Soviet military capabilities in the European theater, whose improvement would largely have to await the carrying out of Khrushchev-sponsored programs combining the reduction of manpower levels with modernization of the Soviet armed forces.

The prime problem for Stalin's successors was what to do in the face of the rapid expansion of U.S. strategic nuclear forces and overseas base networks touched off by the Korean conflict, developments which threatened to widen the strategic power advantage already enjoyed by the United States. One approach involved strengthening PVO Strany, which in 1954-55 became a completely independent service. New interceptor aircraft--the MIG-17 and YAK-25--were introduced, and warning and control facilities were extended and refined.

Although these measures, together with increased emphasis on civil defense, brought some improvement in Soviet strategic defenses in the

mid-1950s, they fell considerably short of enabling the PVO to cope with the kind of threat posed at that period by SAC--namely, bomber attacks under high-altitude, all-weather conditions. Nor did the considerable effort expended on the Soviet Union's first surface-to-air missile system, the SA-1, promise to provide the answer. Site construction for this system began around Moscow in 1953, and the first of several "herringbone" sites became operational a year later. However, the system proved to have basic shortcomings and was not duplicated elsewhere.

Only after widespread deployment of a second-generation SAM system, the SA-2, began in 1958 did the high-altitude, all-weather capability of the PVO improve substantially, but by that time U.S. bomber forces had adopted low-level penetration tactics against which new types of defensive systems would be required.

The second avenue of strategic effort pursued by the post-Stalin leadership under Khrushchev involved the improvement of Soviet strategic offensive capabilities, largely on the basis of developmental programs initiated under Stalin. In the strategic bomber field, 3 new aircraft were in the flight-test phase at the time of Stalin's death: The TU-16 (Badger) medium jet bomber, and two heavy bombers, the pure-jet Mya-4 (Bison) and the turboprop TU-95 (Bear). What Stalin's original production plans for these aircraft may have been is not known; however, the programs that were carried out under Khrushchev resulted

by the end of the 1950s in production of more than 1,700 Badgers, but fewer than 400 Bison and Bear heavy bombers, both of which proved to have shortcomings for intercontinental strategic operations.

It remains an unsettled question whether, in responding to a U.S. strategic threat of growing dimensions in the mid-1950s, Khrushchev had set out deliberately to acquire new strategic bomber forces for a "peripheral" rather than an "intercontinental" strategy, or whether the Soviet strategic delivery technology and operational capability then available dictated the choices made. In any event, however, the Soviet Union did not seek to match the United States in intercontinental bomber forces. Rather, it concentrated on forces of peripheral range that could provide significant operational capabilities against SAC's overseas bases, and that could demonstrably back up a Soviet policy of holding America's allies in Europe hostage.

With regard to nuclear weapons development, which had been the province of Beria's Ministry of the Interior (MVD) under Stalin, the post-Stalin leadership took prompt measures to place responsibility elsewhere, both by liquidating Beria and transferring the nuclear program to a new Ministry of Medium Machine Building. Although not necessarily a matter of cause and effect, organizational changes in the Soviet program were followed by a steady increase of test shots, including detonation of the Soviet Union's first thermonuclear device in the latter part of 1953, along with expansion of production

facilities for nuclear materials. Meanwhile, the growing stockpile of nuclear weapons remained for the most part out of the immediate hands of military users, being kept in national reserve storage sites and special complexes maintained by the Ministry of Medium Machine Building under oversight of the KGB

Strategic missile development programs that had been initiated by Stalin began to call for production and deployment decisions not long after his successors took over. It is likely that some of these decisions were made in connection with drawing up the sixth Five-Year Plan in 1955, particularly with regard to the SS-3 and SS-4 MRBM systems. Their deployment began a couple of years later in the western U.S.S.R., where by the end of the 1950s a force of several hundred medium-range missiles had been built up, giving redundant coverage of targets in Western Europe and the Mediterranean already within reach of medium bombers of the Soviet strategic air arm.

The first Soviet strategic missile with the potential for intercontinental attack upon the United States itself was the Korolev-designed SS-6. One of these missiles ostensibly became the world's first ICBM to be successfully flight-tested--in August 1957. When Sputniks I and II--also launched by the SS-6 booster--followed in quick succession in October and November 1957, the psychological impact of these achievements was tremendous, on the one hand making Khrushchev and his colleagues heady with success and on the other leaving the West shaken by the

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implication that the U.S.S.R. had forged well ahead of the United States in missile-space technology.

Although the Sputniks gave rise to talk of a "missile gap," the first-generation SS-6 missile did not turn out to be a satisfactory ICBM system for a variety of technical and logistics reasons, and the only 4 SS-6 launchers ever deployed first became operational in 1960. Revision of initial deployment plans for this system may have occurred in the latter part of 1958 at the same time that economic reprogramming was under way to replace the unfinished sixth Five-Year Plan with a new and unprecedented Seven-Year Plan (1959-1965).

Deployment programs for the SS-7 and SS-8 systems, the 2 parallel second-generation Soviet ICBMs, likewise appear to have been cut back from original plans, owing to various technical, economic, and organizational factors. In the several years following the first field construction starts in late 1959, the total number of SS-7 and SS-8 launchers deployed came to little more than 200--much less than had been anticipated by the West before improved intelligence helped to deflate the "missile gap" in 1961.

Although limited deployment of early Soviet ICBM systems had the effect of postponing the day when the Soviet Union would actually possess an operational missile force with significant intercontinental capabilities against the United States, Khrushchev--taking advantage of the great uncertainty about Soviet force deployments then prevailing in the West--strove in

the late 1950s and early 1960s to foster the impression that such a force already existed and that the balance of strategic power had shifted in Soviet favor. His reasons for resort to a missile diplomacy based on exaggerated strategic claims are not altogether clear.

In one view, he may have embarked on a calculated game of strategic bluffing and deception precisely in order to compensate for the lag in deployment programs necessary to back up his new military policy emphasizing the retaliatory power of Soviet strategic missile forces. In another view, he may simply have succumbed gradually under external and internal pressures to the temptation to exploit an image of growing Soviet strategic power which the West itself helped him to propagate by its much-publicized concern about a missile gap.

In any case, however, Khrushchev would eventually discover that he could not reap major political gains from the Sputniks and missile test firings when they were not backed up by substantial ICBM force levels. Moreover, his exercise in missile bluffing had the unwelcome effect of stimulating the United States to throw its own technological and production resources more fully than before into the missile competition.

The Post-Sputnik Surge in U.S. Missile Programs

By mid-1957, the technological preconditions for stepping up competition in ballistic missiles with the Soviet Union had largely emerged

in the United States, but there remained significant constraints against doing so, such as the primary institutional commitment of both the Air Force and the Navy to manned aircraft, the conservative fiscal policies of the Eisenhower administration, and the still undefined character of the Soviet missile threat itself.

What greatly altered U.S. perception of the latter and imparted a strong new momentum to the American ballistic missile effort was the launching in the autumn of 1957 of the first Soviet Sputniks. Many times the weight of the as-yet unlaunched first U.S. satellite, the Sputniks came not only as a distinct technical surprise, but also as a political shock. They seemed to reinforce warnings from such diverse quarters as the Gaither panel, appointed by Eisenhower himself, and the Senate Armed Services Preparedness Subcommittee, chaired by the Democratic opposition, to the effect that the U.S.S.R. had probably already surpassed the United States in ICBM development, and that the SAC bomber force was endangered by the prospect of an early Russian ICBM capability.

Combined with Khrushchev's misleading claims of Soviet missile preeminence, a high failure rate in early U.S. ballistic missile tests, and intelligence uncertainties that tended to favor the case of those who felt that the Soviet Union would try to get a jump on the United States in the strategic arms competition by deployment of a large ICBM force, the post-Sputnik climate during the latter years of the

Eisenhower administration helped to nourish controversy over an impending missile gap.

In both strategic and political terms, the missile gap controversy was to have important consequences. Strategically, it put pressure on a reluctant Eisenhower administration to shift from a policy of reducing the defense budget in the service of fiscal goals to one of expanding it in response to strategic challenge, with the result that American ICBM and SLBM forces were developed and deployed at a much more accelerated pace than would otherwise have occurred. Politically, the Eisenhower administration was placed on the defensive by adverse reaction at home and abroad to the implications of a missile imbalance, and although it sought to convey assurance that there was no cause for alarm, the American electorate evidently did not agree, for the notion that the United States was falling behind in the strategic competition became a potent theme in John F. Kennedy's successful campaign for election to the Presidency in November 1960.

Ironically enough, only a few months after the change of administrations, new findings from satellite reconnaissance and other intelligence collection programs that had been initiated during the Eisenhower incumbency were to deflate the missile gap and help to reverse the image of a strategic power balance shifting in Soviet favor. However, the U.S. programs already set in motion to repair what had been perceived as a deteriorating strategic balance had

acquired too much organizational and political momentum to be promptly turned off. For example, by the time Eisenhower left office, 1,100 strategic missile launchers (two-thirds of the force level ultimately reached) had already been programmed, although most of them had not yet been deployed. Even with marginal readjustment of some programs, U.S. funding for strategic forces was to reach its peak of more than 25 percent of the defense budget during the first 2 years of the Kennedy administration.

The major strategic programs pursued in the post-Sputnik period involved offensive missile systems. In the ICBM field, the ATLAS and TITAN I systems were the first to reach operational deployment in 1959 and 1962, respectively. There was, however, no disposition to deploy large numbers of these liquid-fueled, first-generation systems, and their deployment programs were closed out in 1962 at 123 ATLAS and 54 TITAN I launchers. A much improved liquid-fueled TITAN II, which entered the force in 1963, also was deployed only in small numbers (54), but because of its large payload this missile was to have a long life in the U.S. inventory of land-based ICBMs.

Unquestionably, the most significant program in the post-Sputnik buildup of the U.S. ICBM force was the solid-fueled silo-based MINUTEMAN, which, after an accelerated R&D phase beginning in 1958, first reached operational deployment in December 1962. By the end of the following year, 370 MINUTEMAN I had been deployed, which, along

with ATLAS and TITAN, brought the operational ICBM force to a little more than 600 launchers, about the same as the number of SAC bombers kept on ground alert at that time. Although the planning decisions which were to fix the ultimate size of the MINUTEMAN force at 1,000 were not made until 1964,it was the rapid surge of MINUTEMAN deployment the previous year that conclusively wiped out any likelihood of a Soviet ICBM lead in the early 1960s, and that established a land-based ICBM force as a major element of U.S. strategic power, rather than a mere supplement to bomber forces.

The third element of what was to become the Triad of U.S. strategic forces grew out of the Navy's POLARIS SLBM program, which like the Air Force MINUTEMAN was made possible essentially by breakthroughs in solid-propellant technology. Under an R&D program authorized in 1956 and accelerated a year later, and despite several early missile test failures, the first fleet ballistic missile submarines armed with 16 POLARIS A-1 missiles became operational in November 1960. A ceiling of 19 POLARIS submarines set by the Eisenhower administration was raised to an authorized level of 41 submarines and 656 missiles under Kennedy. By the time President Johnson took office after Kennedy's death in November 1963, approximately half of that number had been commissioned.

Strategic bomber programs, which had accounted for some 70 percent of U.S. expenditures for strategic delivery systems in 1957, could

claim only about 25 percent by 1962, as the outlay on missiles grew and that on bombers declined. The principal bomber trend of this period was a gradual drop in overall force levels and a shift in the composition of SAC's bomber force from B-47s to B-52s, with the latter aircraft reaching its planned level of 600 in 1961. Meanwhile, beginning in 1960, the B-47 was phased out at a somewhat faster rate than ICBMs entered the strategic inventory.

While the Soviet missile and space accomplishments that helped to spur an expanded U.S. missile effort did not stimulate a buildup of the U.S. strategic bomber force, they did exert an appreciable influence on SAC's operational and basing posture, primarily because it was expected that Soviet missiles would greatly reduce the warning time available. Placing bombers on 15-minute ground alert, hardening command and control facilities, establishing both an airborne command post and an airborne alert, and shortening deployment time at oversea bases, were among measures taken during 1959-61 to improve SAC's survivability in a reduced-warning envoronment.

Though there was no increase in U.S. allocations for strategic defense after fiscal year 1957, protection of the U.S. retaliatory strike capability against possible missile attack had a high priority in U.S. policy in the post-sputnik period. Emphasis was placed especially upon missile warning and detection systems such as BMEWS and MIDAS, which were seen primarily in terms of

increasing the chances for survival of U.S. offensive forces. The need for a vigorous R&D program to develop an ABM system also was recognized; however, repeated attempts by the Army to get authorization for production and deployment of its NIKE-ZEUS and NIKE-X systems were unavailing during both the Eisenhower and Kennedy administrations in the face of persistent doubt whether systems for defense against missiles--either active ABM or civil defense--could keep up with advances in strategic offensive technologies.

The rapid emergence of much more diversified U.S. strategic delivery forces in the post-Sputnik period had the effect, among other things, of bringing into contention a number of interrelated strategic planning and organizational issues, such as the appropriate mix of bombers, ICBMs, and SLBMs, and the question of whether the new forces coming into the inventory should possess only the minimum capabilities needed for attacking cities or the more demanding capabilities required for counterforce attacks against military targets. Another problem was that of coordinated targeting and control of nuclear operations, an old issue upon which the POLARIS program had a catalytic effect, since it precipitated a heated dispute between the Air Force and the Navy as to who would control this new strategic system when it was deployed.

In the compromise solutions worked out in the summer of 1960, the Navy retained operational control of POLARIS, but a joint mechanism over which SAC had preeminent influence, the JSTPS, was set up for

coordinated strategic targeting and operational planning. By the end of 1960, the JSTPS had prepared the first SIOP, or Single Integrated Operations Plan. It reflected strategic policy guidance calling for large-scale attack upon a combined list of military and urban-industrial targets.

The Impact of the Cuban Missile Crisis on Soviet Strategic Policy

In early 1962, when the the decision to undertake covert deployment of Soviet-manned missiles to Cuba evidently was made, the Soviet Union faced an unenviable strategic situation. Not only had deflation of the missile gap and Soviet failure to force the Western allies out of Berlin in 1961 blunted Khrushchev's missile diplomacy, but at the same time the post-Sputnik buildup of U.S. strategic forces was gathering a momentum that contrasted uncomfortably with the slow pace of Soviet ICBM deployment programs. Presumably, Khrushchev acted to salvage a deteriorating position, although precisely why he decided upon the unprecedented emplacement of Soviet offensive missiles in Cuba and what he expected to accomplish thereby in strategic and political terms remains a matter of debate.

Perhaps the most plausible explanation is that Khrushchev mistakenly believed that he could attain important political gains without great risk through a "quick fix" of the Soviet strategic posture that was essentially symbolic in character, rather than based upon a

rational military calculus. At the same time, however, there is some possibility that, in its military aspects, the Cuban missile deployment may have been carried out in accordance with an evolving Soviet strategy of targeting against the U.S. strategic command and control structure.

Whatever its genesis, the Cuban missile crisis of October 1962 not only ended up badly for Khrushchev but also marked a significant turning point in the Soviet approach to the strategic arms competition. Prior to the Cuban experience, the strategic forces fielded by the Soviet Union, though substantial in size, possessed only modest capabilities for operations beyond the Eurasian periphery. After the crisis, when a "never again" mood among the Soviet leadership seems to have been translated into a resolve to catch up with the United States in strategic power of global dimensions, the Soviet Union invested large resources in programs that would produce during the next decade an unquestionably competitive strategic offensive arsenal of intercontinental range.

This does not mean that without the Cuban missile crisis Soviet strategic forces would have held constant at low levels of deployment. The R&D programs which culminated later in deployment of intercontinental systems had been initiated prior to the Cuban venture and would probably have come into service under any likely sequence of events. The Cuban experience appears to have acted as a catalyst, however,

effecting a major political shift within the leadership on the desirable timing and scale of ICBM and SLBM deployment. The SS-11 program, in particular, was apparently advanced in time and very likely increased in scale in reaction to the Cuban crisis.

Khrushchev's own position on the priority to be given to post-Cuba strategic force increases is not altogether clear, but it appears likely that before he was forced out of office in October 1964, internal leadership politics, together with external factors affecting the strategic power balance, had persuaded him to go along with a more extensive menu of strategic deployment programs than he would have preferred.

The two leading choices for deployment among several third-generation Soviet ICBM systems proved to be the SS-9, a product of M.K. Yangel's design bureau in Dnepropetrovsk and the SS-11, designed in Moscow by a team under V.N. Chelomei. The latter system went through a crash program after Cuba, characterized by the starting of operational site construction in the field before the missile had been successfully flight tested. Although the SS-11 lacked the counterforce potential of the SS-9, it was only about one-third the size and cost of Yangel's design. This appears to have been a key factor in selection of the SS-11 as the main answer to a competition with the United States in numbers of deployed launchers. The MINUTEMAN ICBM set the standard for staying in the missile competition of the 1960s at around 1,000 ICBMs, and given the U.S. Five-Year Defense Program of that period the standard might have been interpreted as 1,300. At the time Khrushchev

was removed--October 1964--construction of SS-11 silos had begun at 5 field complexes to contain about 400 launchers, the first few of which became operational 2 years later. Assuming that this launcher figure represented the size of the SS-11 program approved while Khrushchev was still in office, then the remainder of the program, which eventually brought the number of deployed SS-11 launchers to almost 1,000 by the 1970s, would have resulted from decisions by his successors, probably in 1965--the year when the eighth Five-Year Plan (1966-1970) was drafted.

For the SS-9, which first became operational the same year as the SS-11, the deployment program produced a force of about 290 launchers by the early 1970s. The considerations accounting for the SS-9 program have been the subject of much speculation and controversy among Western analysts, especially concerning its counterforce implications. Although the SS-9 appeared to be designed as a hard-target killer and judging from its firing azimuths, to be aimed at U.S. ICBM complexes rather than urban centers, the number deployed was not sufficient to threaten more than a nominal portion (less than one-third) of the silo-based U.S. ICBM force, assuming that the number of aiming points to be attacked was the same as the number of individual U.S. launchers.

This could mean on the one hand that Soviet decision-makers judged the SS-9 to be too expensive to deploy in the numbers required to cover

the entire U.S. force, or that they regarded a capability to disable no more than a third of the U.S. launchers as adequate insurance against a U.S. attack. On the other hand, however, Soviet planners may have believed that they had found ways which promised to disable most of the MINUTEMAN force with a smaller number of SS-9s, such as directly attacking launch control centers (one for each 10 missiles in a MINUTEMAN launch complex), or utilizing EMP effects against strategic command and control and missile guidance systems, or some combination of the two. Whether such ways of achieving a counter-force capability against the bulk of the MINUTEMAN force had in fact become part of the rationale for the SS-9 deployment program cannot be documented, but circumstantial evidence does exist.

Another third-generation strategic delivery system which was given a modest place in the post-Cuba buildup of Soviet strategic forces was the SS-13, the Soviet Union's first solid-fueled ICBM. Although it compared more closely with the MINUTEMAN than any other Soviet missile, the SS-13 evidently encountered technical problems that ruled it out as the choice for a numbers competition in deployed launchers. Only about 60 of these launchers became operational.

Finally, the Y-class submarine program, designed to give the Soviet Union a submarine-launched ballistic missile capability roughly comparable to the U.S. POLARIS,appears also to have achieved authoritative approval in the wake of the Cuban crisis. The decision to devote large resources to this program evidently came at about the same time in 1963

that post-Cuba decisions for deployment of the SS-11 and SS-9 were being thrashed out. The first Y-class submarine entered operational service in 1969; by the time the production program ended 4 years later, 34 of these submarines equipped with the SS-N-6 missile of about 1,300-mile range had joined the Soviet SLBM force.

Soviet strategic defense preparations after Cuba continued to address the problem of defense against bombers and the newer one of coping with ballistic missiles. In the case of air defense, extension of the SA-2 high-altitude surface-to-air missile system received major attention, although curiously, deployment of the SA-3 missile system, designed for defense against low-altitude bomber penetration, progressed very slowly for several years after it became operational in 1961.

In the case of ABM, a decision to deploy the GALOSH system around Moscow evidently came in 1962 after the unsatisfactory GRIFFON project near Leningrad had been cancelled, and at about the same time Khrushchev was claiming that Soviet defensive missiles could "hit a fly in outer space." The original program of approximately 200 GALOSH launchers was cut back to about 100 in 1965. Although some of the GALOSH launch positons became operational by 1967, giving the Soviet Union the distinction of having the world's first operationally-deployed ABM, the system proved to have inherent shortcomings which led to halting the deployment program with only 64 of the 100 launch positions of the revised GALOSH layout completed.

The strategic defense program least well understood in the West was the SA-5 or TALLINN system, the first elements of which began to appear in the Baltic area in early stages of construction in 1963. After this system became operational in 1966, a surge of site construction within the next few years produced nearly 1,700 launchers at 100 separate complexes. Although some testing of the SA-5 indicated air defense use, other characteristics of the system seemed to point to a potential ABM role. Which purpose the system was originally intended to serve remains an unsettled question.

During the evolution of their strategic posture in the last half of the 1960s, the Soviets made a real effort to improve operational capability. This included hundreds of troop training missile shots, hardening of command and control facilities, and occasional exercises involving coordinated strikes of ICBMs, SLBMs, and bombers. An improvement in readiness state was also achieved, but despite much doctrinal emphasis on readiness high enough to permit preemption, a relatively low alert level still appeared to characterize the Soviet posture, suggesting a tendency to sacrifice some readiness in order to ensure more secure control over operational strategic forces in peacetime.

Policy Constraint Upon U.S. Strategic Force Growth in the 1960s

The decade of the 1960s found the strategic policies of the Soviet Union and the United States curiously out of phase in at least one basic respect. During most of the decade, Moscow's strategic policy was bent upon a large-scale buildup of Soviet strategic forces, facilitated by removal of deployment constraints upon intercontinental delivery systems after the Cuban experience. By contrast, the main trend of U.S. strategic policy during the same period was to contain the impressive momentum which American strategic programs had acquired toward the end of the Eisenhower and beginning of the Kennedy presidency.

Centering largely around Secretary of Defense Robert S. McNamara's management of the machinery of defense policy, strategic constraint came to have two separate dimensions: First, placing restrictions upon further growth in the size of U.S. strategic forces; and second, tightening operational controls over these forces so as to assure central policy direction in the heat of crises or actual war.

The primary instrument through which McNamara first sought to constrain force size was the new budget planning process (PPB), which involved, among other things, the making of 5-year force projections. Introduction of this process happened to coincide with the sharp downgrading of the Soviet strategic threat that had preceded the Cuban missile episode. This probably contributed to the initial imposition

of some force size restrictions in connection with the FY 1963 budget, such as rejecting Air Force plans to deploy a mobile MINUTEMAN force of 300 and to add 1,800 fixed-site MINUTEMAN missiles to the previously-authorized force, as well as limiting the B-70 bomber program to airframe development. Such restrictions would only begin to be felt after 1965, since they did not affect the large baseline strategic forces already programmed.

Meanwhile, however, given the combination of institutional interests and genuine conviction supporting the continuation of vigorous U.S. strategic programs, it did not seem likely that constraints upon force size could be sustained indefinitely by budgetary management alone. Additional leverage for a constraint policy was needed, and it was sought primarily through the use of strategic logic, buttressed by explicit cost-effective quantitative analyses, as the basis for rationalizing force-size decisions.

The strategic logic which evolved during the 1960s went through several permutations. Initially, in addition to the principle of assured destruction a redefinition of the second-strike counterforce concept became the basic criterion for force sizing. According to this approach, force levels intermediate between minimum deterrence and full first-strike postures would be appropriate, and could be measured rather precisely in terms of decreasing marginal effect against Soviet targets. It was this concept which underlay McNamara's

Ann Arbor speech of June 1962 which called upon both sides to eschew "city-busting" in favor of attacking military targets in the event of nuclear war.

Emphasis on military targeting tended, however, to become linked with damage-limitation concepts that could lead to expansion rather than restriction of strategic force levels, as studies of a damage-limiting posture commissioned by McNamara in 1963-64 suggested. In reaction to this realization, U.S. policy began to shift.

During 1964-65 the principle was advanced that a meaningful damage-limiting posture was precluded not only because of marginal decrease in what bigger strategic programs could provide, but because any U.S. effort to achieve such a posture would degrade the Soviet assured destruction threat against the United States. It was believed that the Soviets would respond with offsetting force increases.

Thereafter, OSD increasingly narrowed the rationale for strategic forces to the concept of "mutual assured destruction," which downgraded counterforce targeting in favor of the capacity to impose assured second-strike retaliation upon the adversary's society, and which was to remain, ostensibly at least, the basic U.S. strategic rationale for the next decade.

Some of the more visible instances of the application of a policy of force-size constraint involved strategic systems that were vulnerable to technical analysis, notably the B-70/RS-70 and

SKYBOLT strategic offensive programs and the ABM strategic defensive program. For the RS-70 and the bomber-launched SKYBOLT missile, procurement programs were denied completely despite the pressures of politically potent advocates. The demise of the SKYBOLT was finally sealed only after President Kennedy agreed at the Nassau conference in December 1962 to supply the British government with POLARIS missiles as a substitute for SKYBOLT.

In the fall of 1961 McNamara considered briefly the idea of a limited deployment of NIKE-ZEUS batteries to protect 6 cities, but soon reverted to the position taken by successive Secretaries of Defense in the Eisenhower administration that deployment should be deferred. At first, OSD resisted Army proposals to deploy ABM on the grounds that major technical advances were imminent and should be incorporated in the NIKE-ZEUS system before a deployment decision. Later, after NIKE-X had been developed, OSD opposed deployment on the grounds that ABM defenses would stimulate further increases in strategic offensive forces, and in any event would not be worth the effort unless coupled with a large civil defense shelter program which the American public was not disposed to accept.

OSD resistance to ABM was gradually worn down, however, by such factors as the growing belief that a large Soviet ABM deployment program was under way and President Johnson's aversion to being held responsible for an "ABM gap." At McNamara's suggestion the President

had the State Department approach the Soviets in January 1967 on holding negotiations to limit ABM deployment. After this overture failed to produce results in the 6 months stipulated by the President, McNamara was obliged to announce in September 1967 that the United States intended to go ahead with a small-scale (12 sites) deployment of the SENTINEL system, an adaptation of the NIKE-X. But this deployment never took place, and in 1969, under the Nixon administration, the SENTINEL was superseded by the SAFEGUARD missile-site defense system. In turn, SAFEGUARD deployment was terminated, not long after site construction had begun, by the SALT agreement reached in May 1972.

With regard to U.S. offensive missile programs in the 1960s, force size constraints accompanied the process of qualitative improvement. Design improvements were primarily inspired by requirements to sustain alert operations under attack, to maintain greater flexibility to respond to command channels, and to diminish vulnerability to missile defense. These improvements, however, also presented a politically viable substitute for force level increases, and were used in this role as the final decisions were made enforcing deployment ceilings.

The MIRV program provides the most striking example of a tradeoff between offensive missile modernization and force size. Originally, MIRV had been conceived in the early 1960s as a penetration aid to enable U.S. ICBMs and SLBMs to saturate ABM defenses, and in this way

to hedge against expected deployment of a Soviet ABM system. It soon became apparent, however, that MIRV technology promised also to permit increases in the inventory of deliverable warheads without deployment of additional launchers. This fact was used in 1964 to justify final cuts in the planned MINUTEMAN deployment from 1,300 to 1,200 to 1,000 launchers. McNamara's resistance to the damage-limiting mission was compromised, however, for it turned out after modernization of the MINUTEMAN and POSEIDON MIRV systems, that accuracy improvements gave the land-based MIRV system the potential of providing a very significant offensive counterforce capability within the ceilings on force size that had been established.

The tightening of operational controls over strategic forces, the second dimension of the policy of constraint, involved in part a reversal of the strategic logic previously employed to limit force size. While the concept of assured destruction helped in judging force-size issues, it had less appeal when employed in planning actual conduct of operations in the event that deterrence failed. In that case, second-strike counterforce operations against carefully segregated military targets seemed conceptually to offer the best hope of preserving some constraints, maintaining intrawar deterrence, and reducing the weight of societal damage in a nuclear conflict.

SIOP-62 left the President with little choice but response with virtually the entire strategic arsenal, or no retaliation at all. To

rectify this situation and enhance positive Presidential control of strategic forces, periodic SIOP revisions carried out under guidance from the Secretary of Defense sought to allow for witholding part of the force and directing discriminate attack at some appropriate subset of the target list. Significantly, though options were broadened by the revision process, the evolving SIOP and the forces to which it applied did not come to provide a decisive damage-limiting capability through pre-emptive counterforce attack--partly perhaps because of an increase in the number and hardness of Soviet systems to be targeted and partly because of a MIRV-related reduction in the yield of U.S. weapons.

SALT and Soviet Strategic Programs

A notable aspect of the U.S.-Soviet strategic relationship has been the evolution of formal agreements placing limits on the deployment of strategic forces of the two countries. The immediate genesis of SALT can be traced to President Johnson's proposal of January 1967 for negotiations on ABM limitation and there are traces in the diplomatic record as early as 1964. Interest in constraints on interfacing force increases appeared at the highest levels of both governments almost as soon as full strategic deployment plans had been formulated, although the Czechoslovak crisis of 1968 and other factors delayed the formal beginning of SALT until November 1969, after the Nixon administration took office.

In historical perspective the strategic force levels agreed to in the 1972 SALT accord amounted to formal validation of force size decisions that each side had made internally by about 1965. The actual situation was not symmetrical, however, since the United States force structure was already approaching its ceilings, while Soviet deployment was in a relatively early phase with the main thrust of their buildup yet to occur.

The process of accommodating the many asymmetries between the strategic postures of the two sides, including differences in the numbers and quality of their strategic systems, was considerably facilitated in SALT by explicitly permitting force modernization within agreed ceilings, and by the tacit principle that force programming decisions already established unilaterally would not be reversed by SALT provisions. The Soviets do appear to have admitted an important exception to the latter principle, however, in that programs for the fourth generation of Soviet land-based ICBMs--SS-16, 17,18, 19--appear to have been substantially adjusted in order to accomodate the SALT I accords. Basic decisions on R&D for these fourth-generation systems were presumably made in 1965, and deployment decisions in 1970, in phase with the 5-year economic and defense plan cycles. After summit intervention in SALT in the spring of 1971 had set the negotiations on the track that led to the 1972 accords, the impending provisions of the accords, especially the sublimit on heavy missiles, apparently forced Soviet planners into substantial reprogramming.

Changes may have included a cutback in the number of heavy SS-18s programmed, acceleration of the SS-17 and SS-19 programs, and adjustments affecting the peripherally targeted portion of the old SS-11 force that would call for assigning its mission to a mobile IRBM system (the SS-20) not subject to SALT ceilings.

Because testing of most of the new missiles did not begin until the latter part of 1972, the impression gained currency that the Soviets had deliberately held back testing until the May 1972 agreement had been signed in order to conceal the fact that they had new missiles with large throw-weight under development. Although the Soviets may not have been entirely innocent of dissembling, a close retrospective examination of the programs would seem to indicate that, at the cost of considerable disruption, the Soviets, rather than holding back in order to deceive the United States, had actually been trying to advance the pace of fourth-generation deployment ahead of the normal cycle in compensation for necessary adjustments to the SALT sublimits.

Finally, how the strategic forces of the two sides may be affected by further arms control agreements is still to be seen at the point where this history closes. Judging from the extent to which the strategic postures of both have come to be dominated by offensive systems, it seems not unlikely that any new SALT agreements will tend to rest primarily on the conception of balancing off offensive capabilities

against each other. It is conceivable, however, that future technological developments might make for a substantial shift in favor of strategic defense over offense. Should this occur, it might lead to strategic arms agreements structured to emphasize the maintenance of strategic defensive systems rather than offsetting offensive forces as the basis for a stable strategic balance.

Conclusions

Some significant conclusions can be drawn from this history. Representing the authors' judgments, they are not necessarily final truths. None are indisputable. The authors accept the possibility that they themselves could modify or alter their reasoning in light of new information, for it must be borne in mind that neither this volume nor the shelf of studies prepared in support of it represents a definitive account. Given the enormous scope of the subject, a huge volume of documents remains unexamined, and there are important gaps in the evidence that have not been surveyed, particularly on the Soviet side. These facts preclude any claim to finality. Moreover, since the strategic arms competition is still in progress and has fortunately not culminated in a test of strength, future events are likely to alter the shape of the subject still further and change our understanding of past events. For all of the above reasons, many uncertainties remain. Some might yield if greater effort were invested in research and analysis. Some will never be resolved. The assertions appearing here are those which the authors find most nearly consistent with the available evidence. They have important policy implications. For that very reason, they demand continued scrutiny and debate.

Certain basic questions are commonly asked about the strategic arms competition: Have the two countries engaged in an arms race as classically conceived, with the actions of one side forcing reactions by the other? Or, has only one side been reactive while the other pursued an

independent course? In particular has the Soviet Union consistently striven for strategic superiority? Or have both countries been impelled by the imperatives of modern technology, with the political rivalry between them providing the occasion and the context? Such questions spring from a desire to discover a systematic, comprehensible relationship, the understanding of which would provide more reliable guidance for future policy. The conclusions which follow are the best judgments that the authors have derived from the study in response to these vital questions.

1. No consistent pattern can be found.

That is the first important generalization to emerge from the history. The facts will not support the proposition that either the Soviet Union or the United States developed strategic forces only in direct immediate reaction to each other. The Soviets initiated strategic military programs immediately after World War II and sustained strategic force increases in the late 1960s and early 1970s, periods during which the United States was respectively reducing and stabilizing its forces. The United States force increases in the early 1950s occurred at a time when Soviet forces were reasonably stable. By the mid-1970s the United States has not reacted with major force structure changes to the Soviet increases after 1965. The facts and the historical circumstances in which they occurred testify to complex patterns of mutual influence. Neither, however, will the facts bear out that the Soviets

and Americans only marginally affected each other. The prominent place of PVO Strany in Soviet force posture, together with heavy investment in forces almost certainly keyed to defense against U.S. sea-based strategic forces, must be interpreted as reactions to a perceived U.S. threat. The scale and character of U.S. force increases in the 1960s were directly attributable to the shock effect of Soviet successes in rocketry. Nor will the data fit a hypothesis that both sides were helplessly driven by science and technology. The United States developed long-range ballistic and strategic cruise missiles perhaps more slowly than was technically feasible. Soviet programs in solid fuels, inertial guidance, and low beta RVs appear similarly to have been retarded by considerations much broader than basic technical capability. No sweeping generalizations about action-reaction cycles or inexorable Soviet designs or the momentum of science and technology can survive detailed examination of the sequence of events.

2. Both the United States and the Soviet Union have acted imitatively or defensively or enterprisingly, sometimes engaging in all three types of behavior simultaneously.

Actions by either government can be characterized as (a) imitative--one government following a pattern of behavior first established by the other, (b) defensive--one government acting to reduce the effects of measures taken by the other, or (c) enterprising--one government

acting on its own initiative for whatever reason. By these definitions, either imitative or defensive behavior is reactive in character and denotes interaction. Enterprising behavior, by contrast, must have other primary determinants. Since competition may occur in RDT&E*, deployments, doctrine, diplomatic stance, or in basic budgetary allocations, either reactive or nonreactive behavior can take a number of different forms. The clear conclusion to be drawn from a review of history--unwelcome as it may be to analysts or policy-makers in search of rules of thumb--is that both sides may simultaneousy be reacting to one another and taking initiatives.

3. Categories of action and thought have been influenced by differing determinants, and the governing factors for the United States and the Soviet Union have not necessarily been the same.

3.1 In RDT&E, both sides have acted enterprisingly, even aggressively, developing strategic weapon systems up to limits fixed by scientific and engineering feasibility or by international agreement.

3.1.1 U.S. RDT&E has proceeded less evenly than Soviet RDT&E. Largely because a prospect of procurement and deployment has been an important incentive both within the U.S. military Services and among U.S. defense contractors, advanced development has had a significantly faster pace in periods such as 1950-53 and 1958-62, when funds

*Research, Development, Test, and Evaluation.

for defense were relatively abundant and force posture underwent rapid changes.

3.1.2 Soviet RDT&E has shown neither surge nor decline but rather moderate, sustained growth.

With the mission of developing new weapon systems almost regardless of whether or not they are subsequently produced in quantity, Soviet design bureaus have usually worked at an even pace. The number of research and development programs appears to have remained constant, with regular growth in manpower and resources apparently driven by the maturation of individual programs. Comparisons with U.S. RDT&E appropriately evoke the image of the tortoise and the hare.

3.2 In weapon production and procurement, the key determinants have been vested organizational interests subject, however, to redirection by political factors. In general, both U.S. and Soviet deployments of strategic weaponry have followed patterns that could have been predicted, at least roughly, on the basis of (a) knowledge of organizational structure (including role and mission assignments), (b) past practices in resource allocation, and (c) available technology and production capacity. Deviations from these patterns resulted in each instance from high level intervention that changed the organizational structure

or altered the allocation of scarce resources. In the United States, the principal examples of the former occurred in the 1950s when pressure from the President, appointees, and Congress created organizations interested in ICBM and SLBM deployments. Most other deviations were marginal, involving additions to or cuts in planned defense spending incidental to the annual budget process.

Deviations on the Soviet side often appeared to result from conscious decisions by the Politburo. The most far-reaching involved major organizational changes--notably creation of PVO Strany and later of the SRF--but some also took the form of major reallocations of resources, such as the shift from bombers to long-range missiles and the accelerated buildup first of the land-based ICBM force and then of the SLBM force. Subject to important reservations, the generalization holds that organizational structure and momentum probably provide the best explanation for the strategic weapon procurement visible in year-to-year Soviet force deployments.

3.3 Strategic doctrine developed independently on the two sides with interaction, if any, commencing only at a late date. Though drawing on refined theoretical analyses, U.S. strategic doctrine was in large part a rationalization for forces developed and procured as a result of interactions between technical programs,

organizational commitments, and political decisions. Prior to the mid-1970s, it does not appear to have been influenced by Soviet doctrine. Since Russian society prizes philosophical orthodoxy and punishes heresy, the Soviet Union by contrast has had decision processes requiring earlier and more serious consideration of doctrinal issues. But decisions for major changes in force posture also often antedated any evidence of changes in doctrine; consequently it may be that Soviet texts also embodied much post hoc rationalization. In any event, these texts did not imitate comparable U.S. texts, and they specifically rejected key U.S. formulations, such as "mutual assured destruction," as inconsistent with Marxist-Leninist principles. At least as of the 1970s, Soviet strategic doctrine did not appear to be imitative of or particularly reactive to the strategic doctrines of the United States.

4. Because of an information imbalance, American judgments about Soviet strategic programs have involved more uncertainties than have Soviet judgments about U.S. strategic programs.

Denied any but the most meager evidence about the Soviet military establishment, and most of that relating to actual deployments, American planners have had to make estimates open to a very wide range of error. This made possible the "missile gap" alarm of the late 1950s and the swing in the opposite

direction which produced in 1962-70 consistent underestimates of the rate of expansion and future levels of Soviet strategic forces. In part, these misjudgments resulted from a tendency on the part of analysts and even more of policymakers to assume that, in the absence of evidence to the contrary, Soviet and American motivations and behavior were similar. Made in a period when overhead reconnaissance and other techniques were producing much more abundant and reliable data on Soviet weapons tests and deployments, the underestimates of 1962-70 were influenced by assumptions that Soviet leaders resembled American leaders in degree of reluctance to build up a strategic nuclear arsenal and degree of concern about the economic burden of strategic expansion and about the possibility that a large buildup would stimulate new U.S. deployments. The Soviets, on the other hand, have had perhaps a 2-4-year lead in high-confidence knowledge of new U.S. weapon systems and force-level plans and have therefore been able, at least in theory, to plan deployment programs with less uncertainty about their adversary's future posture.

5. In part because much of the strategic arms competition has involved more than imitative interaction, other significant asymmetries have developed or persisted.

5.1 The United States and the Soviet Union have never had a common conception of strategic forces. From the U.S. standpoint, strategic offensive forces were originally viewed as bombers or surrogates for bombers designed primarily, though not exclusively, for destruction of large targets remote from areas where maneuver forces were in contact. The Soviets originally viewed strategic offensive forces as artillery pieces or surrogates therefor, the natural targets for which were maneuver forces and their support facilities. This produced on the American side a consistent tendency to give priority to the to the urban/industrial mission and on the Soviet side to give priority to the counterforce mission.

5.2 U.S. strategic forces were designed primarily for use against the Soviet Union while Soviet strategic forces were originally designed to support theater missions. Though the United States developed a manifest capability for inflicting massive destruction on the Soviet Union, it developed a less manifest capability against Soviet maneuver forces. The Soviet Union initially developed air and missile forces suitable primarily for strategic operations in support of ground force offensives in Europe or other adjacent areas. While Soviet development of ICBMs supplied a capability counterpart to that of the United States, what is known concerning yield and site orientation of some of the SS-11

force suggests some continuity in the view that a major function of missile forces was to provide fire support for theater operations even after the development of intercontinental strategic capabilities.

5.3 The United States and the Soviet Union had different points of departure when rationalizing strategic forces, the U.S. emphasis falling on assured destruction, the Soviet emphasis initially falling on damage limitation. Possessing unmatched strategic offensive power and facing danger of strategic attack as a prospect rather than a reality, Americans developed the notion of deterrence through terror. As Soviet strategic offensive power began to grow, this notion was replaced by the concept of a balance of terror or mutual assured destruction. Thinking about strategic defensive operations quickly narrowed to thinking primarily about means of safeguarding the deterrent forces in case of an enemy first-strike.

The Soviets for almost 20 years had as a central concern how to minimize the damage that the United States could inflict if war broke out. The result was not only heavy investment in air and missile defense but also development and deployment of weaponry specially suited for preemptive operations against U.S. forward bases and U.S. carriers, with force size suggesting that conservative assumptions were being made as

to how many Badgers could get through enemy defenses and how many MRBMs and IRBMs would hit their assigned targets. Evidence concerning Soviet ICBMs down through the fourth generation is not inconsistent with a hypothesis that these weapons, too, were conceived as having damage-limiting counterforce missions.

5.4 Though the United States and the Soviet Union both came to conceive of strategic forces as having the function of war prevention, their views concerning these forces continued to be different, the U.S. emphasizing manifestation of capability for inflicting unacceptable damage on an adversary's homeland, the Soviets emphasizing manifestation of capability for fighting a war. In the United States, to be sure, the doctrinal emphasis on assured destruction was imperfectly reflected in the SIOP and in Service planning. The Soviets, however, appear to have had a different approach, the essence of which was that the better the armed forces were prepared to fight a nuclear war, and the society to survive its effects, and the more clearly the adversary understood this, the more he would be effectively deterred. Sometimes called "deterrence through denial"--that is, seeking to deny the opponent the prospect of a successful military outcome--this approach stands in contrast with the American conception of "deterrence through punishment."

Along with scruples about completely discarding the Leninist tenet that a socialist state is destined to prevail in a war, the equation of effective deterrence with war fighting capability made the Soviet leadership continuously unreceptive to the doctrine of "mutual assured destruction."

5.5 The United States emphasized operational readiness, subordinating questions of postattack command, control, and communications (C^3), and hence, developing a fragile and vulnerable command system. The same lower priority figured in U.S. targeting. The Soviets, by contrast, assigned very high importance to the reliability and invulnerability of their own C^3, and it may well be that U.S. C^3 has had high priority in Soviet strategic force targeting. In part because of the extreme secrecy preserved by the Soviets, in part because of the image of Pearl Harbor, the United States put a premium on strategic force readiness, even when the Soviets had negligible strategic offensive capabilities. Stress on capability for reacting with minimum warning and in circumstances in which communications might be impaired resulted in substantial delegation of responsibility to operational force commanders. In the development of U.S. C^3, chief attention went to ensuring against unauthorized initiation of nuclear warfare; much less attention went to maintenance of central direction and control

of strategic forces after the commencement of war. Proposals made in the 1950s and later for strengthening central C^3 encountered determined opposition from the Services. While development of an integrated command structure was not ignored as force deployment proceeded in the context of separate highly independent operational commands, the level of investment was minimal. The communications network, while elaborate, expensive, redundant, and moderately well-protected, was not coherently integrated and not configured to carry much more than basic authorization for conduct of strategic operations. Strategic force targeting responsibility was vested in JSTPS, but with authority restricted and links to operational force elements physically and organizationally constrained. Little or no provision was made for continuing into wartime the central management of intelligence assets or the integration of intelligence collection with the direction of strategic operations. In short, the United States developed a national command structure which remained into the 1970s weak and much more vulnerable to attack than either U.S. force elements or their immediate command systems. In the Soviet Union, protection of the central command structure received much greater relative investment. As is explained in detail in the text, the configuration of Soviet strategic

weaponry has historically been such as to be consistent with a hypothesis that the Soviets perceived the vulnerability of U.S. C^3 and made U.S. C^3 a prime target in contingency plans for a preemptive attack calculated to limit damage to their own country.

6. No static measurements of strategic forces reflect the decision processes which create those forces.

Strategic budgets, numbers of delivery vehicles, numbers of separately targetable warheads, equivalent megatonnage, and hard-target attack potential have been advanced as gauges of the state of development of the two strategic arsenals and metrics for comparing them. Though there is no consensus on the validity of any one of these gauges, they all somehow measure capability, and efforts to summarize the evolution of the strategic arms competition often use time series of one or more of them. Tables along these lines are provided in appendices to the study. The measurements are products of particular accounting systems--in the OSD Comptroller's office in the Pentagon for U.S. forces and in the intelligence agencies for Soviet forces. None of the accounting systems have been designed to reflect the workings of the decision processes which create strategic forces, and the summary force measures produced do not do so. Showing marginal annual increments, they make the development of strategic forces appear to have been a gradual,

continuous process. When historical events are reviewed in detail, it becomes apparent that, in fact, there were brief, critical decision periods which shaped these seemingly steady trends.

7. Strategic forces on both sides, including those which will materialize in the early 1980s, were products of a few brief decision periods, the last of which came no later than the mid- 1960s (i.e., well before SALT I).

In the development of United States strategic forces, two, perhaps three, decision periods were critical. The first occurred in 1949-51 when the atomic energy program was expanded to produce a large, diversified arsenal of nuclear weapons and the defense budget suddenly more than trebled, providing for large-scale bomber deployment and initial funding for ballistic missile development. These actions were stimulated by the Soviet atomic explosion of 1949 and especially by the North Korean attack on South Korea in 1950 and the subsequent Chinese intervention. A second such period came in the mid-1950s when the Eisenhower administration, prompted in part by the Soviet displays of Bears and Bisons, deliberately rejected the alternatives of shifting resources to theater forces or to strategic defensive forces or seeking negotiated limitations on strategic weaponry and instead increased orders for B-52s and accelerated work on ballistic missile systems keyed to an assured destruction strategy. Another period of critical decisions certainly occurred in 1958-62, when the United States political process provided authorization for the

deployment of ballistic missile delivery systems at roughly the force levels which have since obtained. The technical threat of the Soviet Union dramatized by the Sputnik satellites in 1957 provided critical stimulus for that process. Tables in Appendix 7 show the sharp concentration in time of political authorization for deployment of the major elements of the U.S. strategic forces.

In the Soviet Union, major choices occurred in 1944-46. Despite enormous reconstruction needs, large quantities of scarce resources were poured into high-pressure programs for production of air defense forces and of forces capable of strategic nuclear operations at distant ranges. Since critical allocations appear to have been made in the winter of 1945-46, when demobilization in the United States ran at full tilt, the influence of the United States on Soviet decisions was exerted more by example than by specific action. A second set of decisions in the early 1950s reversed the effort to build up a strategic bomber force and substituted an all-out effort to develop ballistic missiles. In the background was not only the large U.S. strategic force buildup of the Korean War period but also the Eisenhower New Look of 1953-54, staking American prestige on a threat of massive retaliation against Soviet or Soviet-sponsored acts of aggression.

The third and most complicated decision period on the Soviet side was associated with the Berlin crisis of 1961 and the Cuban missile crisis of October 1962. There is evidence that the Soviet leadership

had not only reduced military manpower levels and total allocation for defense, asserting that the capacity of the Strategic Rocket Forces for massive retaliation made possible something like the earlier U.S. New Look, but had also constrained ICBM programs. There is further evidence that each of the two crises had the effect of breaking these constraints and producing political authorization for large strategic forces. Most elements of Soviet strategic force structure down to the 1980s can be traced to this period of reaction. As in the United States, strategic programs authorized by the political system appear to have risen to a new level and then stabilized. The authorizations provided the resource flow and organizational structure necessary to build the strategic arsenal to its later level.

8. The recently tested modifications of the SS-18 and SS-19 ICBMs which have demonstrated accuracies sufficient to threaten a successful preemptive attack on the U.S. MINUTEMAN force, appear to have resulted from adjustments both in development and in deployment plans decided upon after mid-1971 rather than from an evolutionary implementation of the original plan. There appear to be at least two distinguishable stages in the history of these systems.

The original decisions to develop the SS-18 and SS-19 were made around 1965. Tests in the 1970s eventually documented a clear commitment to MIRV technology and a reasonable effort to improve accuracy,

The accuracy results originally achieved, however, and the underlying technology suggested that the designers had worked with accuracy specifications that did not represent as great a threat to U.S. MINUTEMAN silos as do the most recent accuracy results.

There are a number of circumstances which suggest that a policy decision was made in the early 1970s to produce variants of the SS-18 and SS-19 under more demanding specifications and that actual deployment decisions for these variants were not made until after 1975. First, there appears to have been a fundamental review and redirection of the entire Soviet ICBM program from mid-1971 to late 1972, and this is a plausible time for R&D decisions to have been made resulting in full system testing in 1978. Second, the new variants, the SS-18 particularly, do reflect quite substantial redesign. Third, there is a significant possibility that the new variants are associated with a new version of the 111-X command silo which differs in quite important ways from the original version. If that is true then, fourth, the deployment program for the SS-18 and SS-19, which was still using the original III-X design as late as 1975, indicates that a significant part of fourth generation deployment was committed to the original system designs before the advanced accuracy variants became available. Though uncertainties prevent any definitive conclusions, these circumstances, particularly the third and fourth points, do suggest that the Soviet commitment to deployment of systems with highly advanced accuracy is

of comparatively recent origin and that full deployment of these systems to achieve a destabilizing threat to MINUTEMAN might involve quite a substantial reconstruction in launch groups started between 1973 and 1975.

The obvious implication of this argument, should it be confirmed by the evolution of events over the next few years, is that there has been an element of reaction in the Soviet commitment to advanced accuracy systems. The timing and character of the two-stage process does not readily fit the supposition that these systems have been completely determined by indigenous military doctrine and deployment philosophy. Available evidence provided by the evolving retrofit program is not yet sufficient and not completely enough analyzed to distinguish between the various possible triggers of a Soviet reaction. The SALT I agreement, the Vladivostok agreement,* U.S. doctrinal discussions, and the U.S. advanced warhead program are all possible sources of explanation that should be explored as evidence accumulates over the next few years. The analysis of these possibilities depends upon establishing the precise timing of Soviet R&D and deployment decisions. The latter at least will only be possible when it can be established whether extensive reconstruction is in fact required for the advanced systems and whether it is in fact undertaken.

*At Vladivostok in November 1974, the United States and the Soviet Union agreed on further negotiations for a long-term agreement to limit strategic offensive arms based on 5 specific provisions.

9. Apart from a few critical moments, when decisions on one side or the other produced surges to new levels of preparedness, the central tendency in the American-Soviet strategic arms competition has been toward constraint on quantitative force deployments.

The surges are observable and noteworthy because they contrast with basic trends toward only moderate and controlled growth in strategic arsenals. On both sides there was resistance to deployment of some types of strategic weaponry. Americans were generally deliberate in fielding long-range missiles. Once Stalin was gone, the Soviet government was quick to retreat from building-up a large long-range bomber force.

Organizational and doctrinal evolution in the two countries produced preferences for certain types of strategic weaponry. Though the interested organizations may have had almost unlimited ambitions concerning numbers and performance characteristics of the systems they wanted, they had not only to cope with rival organizations but also to avoid disrupting their own internal balances. Also, though in different ways, they were subject to control from higher-level planners and political leaders.

Surges in strategic forces deployments sprang from interaction between a scientific community producing basic technical developments and political leaders affected by immediate crisis events. Neither group was impelled to develop comprehensive military strategies integrating

weapons into systematic plans for their use. This was not their natural function. Moreover, the extreme destructiveness of nuclear weapons all along rendered the development of credible doctrine extremely difficult. Actual decisions on force levels were thus driven by very limited, very primitive calculations responding to technical possibilities and immediate political circumstances. New categories of military capability were established--largely ICBM and SLBM forces to supplement (or in the Soviet Union largely substitute for) strategic bombers. The levels of these forces seem to have been arbitrarily determined initially, although subsequently they came to be linked to targeting and vulnerability considerations. Then, once these levels were established, strong tendencies worked in both societies to make only marginal adjustments in them. Formal agreements limiting strategic arms deployments emerged as a ratification of these naturally occurring constraints. Because of the significant time lags between surges in the political decision process and the observable effects of strategic deployment, trend-lines in static indicators obscure not only the existence of critical decision points but also the inherent tendency toward stabilization, for they suggest a steadily increasing curve of competition when the true pattern is actually one resembling a short flight of stairs with wide treads.

10. The preconditions for disruption of equilibrium and surge toward new levels of competition have been (a) the ripening of a new technology, (b) the existence of at least a rudimentary organization capable of deploying the technology, and (c) development at high levels of government of a conviction that the adversary has raised the level of competition or is about to do so.

11. The United States does not have a record of accurately estimating prospective Soviet strategic programs. It has been consistently misled by trend-line extrapolations which underrated the likelihood and effects of major program alterations and the tendency toward force-level stabilization. In view of the stakes, it behooves the U.S. Government to develop estimates more sensitive to possibilities of change.

In the mid-1950s U.S. analyses erroneously forecast Soviet Bison and Bear production as matching the rate of previous TU-4 production. They did not detect until afterward the shift to guided missiles. Subsequent errors in forecasting a "missile gap" and then in 1962-70 in underestimating prospective Soviet strategic missile deployments were functions not only of a lack of information and mirror-imaging but also of a tendency to project into the future trends which have been observable in the recent past. Such extrapolation is comparatively safe since it provides analysts with a ready line of defense in case of error. The

alternative of projecting change involves independent judgment and hence more risk of blame. Nevertheless, since the historical record suggests that linear extrapolation has almost always been wrong, it seems clear that some alternative is desirable.

First of all, the estimates should be grounded in close study of the history of at least the preceding 20 years, for most of the evidence available for analysis represents outcomes of choices made sometime within--in most cases early in--that time period. Second, they should focus on the question of what decisions, taken when and in what circumstances, would have produced those currently visible outcomes. Third, they should review the question of whether any critical decision-period may have occurred subsequently or may be about to occur, what might be the outcomes of alternatives then chosen, and when they would first come into evidence. It cannot be over-emphasized that the estimating of Soviet strategic programs is only very secondarily a matter of technical assessment; it calls primarily for the exercise of historical analysis and imagination.

12. <u>The period after 1976 is one in which there is risk of political decisions on one side or on both sides driving the quantitative strategic arms competition to a new and higher level.</u>

As was the case at critical decision periods in the past, new or greatly improved technologies are becoming ripe for deployment. Organizational structure exists to accommodate these technologies.

A major qualification concerning inherent stabilization emerges from observation that the decisions of the early 1960s to produce thousands of strategic delivery vehicles, followed by decisions of the mid-1960s to multiply their warhead loadings, gave rise to organizations managing the production, deployment, and military operations of these weapons. In creating these organizations, the two societies displayed their characteristic styles--a decentralized arrangement with dispersed jurisdiction over various aspects of the process in the United States; a highly centralized apparatus in the Soviet Union. On both sides, however, military applications were developed for the weapons produced and a process of rationalization began to weave a web of strategic logic around the emerging force structure.

In the United States, strategic logic interacted with developments in weapon technology to create pressures for major adjustments in the established force structure. This occurred largely because guidance system improvements made multiple warhead missiles-- originally intended to ensure penetration of ABM defenses--apparently effective weapons for attacking hardened ICBM installations. The prime principle that deterrent forces must not be vulnerable to preemptive attack is challenged by the prospect of Soviet MIRV deployments optimized for hard target attack. There have also been inevitable pressures for improvements in U.S. offensive forces, utilizing advanced guidance and warhead technology to maximize attack capability against the Soviet ICBMs.

In the Soviet Union the organizational effects are much harder to judge. It is apparent that the Soviet planning system is more comprehensive and more integrative; it attempts to relate strategic force posture to elements of the overall strategic situation which are treated separately in the United States. Strategic forces, for example, are much more heavily involved in support for integrated military operations in the theaters peripheral to the Soviet Union. The standard parameters of strategic capability--launchers, throwweight, EMT*, etc.--which so dominate U.S. conceptions of the strategic balance are assessed in the Soviet Union in relation to a broad range of other factors--strategy, operational tactics, initiative, surprise, command structure performance, and political position. As compared with the United States, Soviet planning seems less driven by technical factors and more affected both by operational planning of the professional military and by political calculations of the leadership.

From the U.S. standpoint, the prospect that Soviet ICBMs with hard target kill capability could credibly threaten the U.S. land-based ICBM force destabilizes the strategic relationship. From the Soviet standpoint, the same might be true of the prospect of large-scale deployments of highly accurate air-launched and submarine-launched cruise missiles.

The record of the past emphasizes two cautionary points. First, because of the information imbalance, the tendency to mirror-image,

*Equivalent Megatonnage

and the tendency to rely on linear projection, the U.S. policy process is prone to misinterpretation of Soviet force developments. The result is to widen greatly the risk that evidence will be construed to support preconceptions rather than to test them. The second point is that one of the few consistently discernible features of the Soviet policy process is high sensitivity to technological inferiority. Given that the preconditions obtain for a new surge in the quantitative competition, these factors could contribute to a dynamic driving complicated political interactions which would override any tendency toward equilibrium.

13. C^3 vulnerability merits much more attention than it has received both as a problem for the United States and as a key concern for the Soviet Union.

In combination, Soviet focus on the relative vulnerability of the U.S. command structure and evident Soviet concern for the vulnerability of their own command structure could produce situations of very grave danger. In the circumstances in which Soviet strategic forces evolved, the concept of a preemptive attack on the U.S. command structure offered great appeal. It provided the best means of achieving damage limitation with inferior forces. This concept seems to have survived after the strategic balance changed. Their heavy emphasis on invulnerable C^3 suggests that Soviet planners have consistently feared such a strategy being used against the U.S.S.R. Moreover, individual and institutional memory of 1941 is stronger in the Soviet Union than is memory of Pearl

Harbor in the United States. Crisis circumstances could put Soviet leaders under extreme pressure to detect the moment when a U.S. offensive seemed to be inevitable and to take decisive action ahead of time.

With very different perspectives of the strategic situation and of the factors which affect it, U.S. policy makers in time of crisis could well not be sensitive to this potential problem in the Soviet posture or to the impact that the normal process of placing U.S. forces on advanced states of readiness might have. Even if aware of the issue, policy makers would not be able suddenly to assume full centralized control. Of all the many asymmetries in force structure and strategic perspective which divide the two adversaries, C^3 in the light of historical developments could be the most serious.

APPENDIX 1

Chronology of Major Events

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U.S. Navy, History of the Strategic Arms Competition, Supporting Study, "U.S. Strategic Missile Submarines," Oct 1975 (S); Supporting Study, "Soviet Strategic Missile Submarines," Oct 1975 (S)

U.S. Army, History of Strategic Air and Ballistic Missile Defense, 1945-1972, Book III, Sept 1975 (TS)

History of Strategic Arms Competition, 1945-1972

Chronology of Major Events

1945

16 Jul	Atomic device tested at Alamogordo, N. Mex.
2 Aug	Potsdam Declaration by Attlee, Stalin, and Truman announced postwar plans
6, 9 Aug	Atomic bombs dropped on Hiroshima and Nagasaki, respectively

1946

5 Mar	Winston Churchill Iron Curtain speech at Fulton, Mo.
14 Jun	U.S. offer to destroy atom bombs and to release atomic secrets to an independent authority made at first meeting of U.N. Atomic Energy Commission
31 Dec	U.S. Atomic Energy Commission created at midnight

1947

12 Mar	Truman Doctrine promulgated to combat Communist insurgency in Greece and Turkey
5 Jun	Marshall Plan for economic reconstruction of Europe announced
13 Jun	Soviet Union refusal to participate in Marshall Plan
Jul	Kennan article outlining "containment" policy appeared in Foreign Affairs
26 Jul	National Security Act signed by Truman

1948

13 Jan	Finletter Commission report released, backing the strategic nuclear bomber as principal U.S. offensive weapon; reiterated in Brewster Committee report, submitted to Congress on 1 March
25 Feb	Communist takeover of Czechoslovakia
17 Mar	Brussels Pact signed by the U.K., France, Belgium, the Netherlands, and Luxemburg.

24 Jun	Berlin blockade instituted by Soviets
26 Jun	Airlift to supply West Berlin begun by Britain and U.S.
28 Jun	Yugoslavia expelled from Cominform

1949

4 Apr	NATO Pact signed by 12 nations
12 May	Berlin blockade lifted
23 Sep	U.S. announcement of 29 August atomic explosion by Soviet Union

1950

31 Jan	Truman decision to build H-bomb announced
14 Apr	NSC 68 submitted to National Security Council, warning of Soviet advances and recommending the strengthening of U.S. strategic forces
25 Jun	North Korean invasion of South Korea

1951

19 Apr	Gromyko charge at Foreign Minister Deputies meeting in Paris that U.S. was starting a world's arms race
23 Oct	First U.S. B-47 delivered to operational unit

1952

3 Oct	Atomic device exploded by British
31 Oct	Thermonuclear device in megaton range exploded by U.S. at Eniwetok

1953

20 Jan	Eisenhower President
5 Mar	Death of Stalin; Malenkov Premier
27 Jul	Armistice signed in Korea

20 Aug	Soviet announcement of explosion of thermonuclear device on 12 August
30 Oct	NSC 162/2 approved by Eisenhower, emphasizing the threat of massive atomic retaliation as a deterrent to aggression and a means to reduce defense costs
8 Dec	"Atoms for Peace" plan presented to U.N. by Eisenhower

1954

Jan-Mar	SA-1 surface-to-air missile system deployed by U.S.S.R.
12 Jan	Dulles's "massive retaliation" address before Council on Foreign Relations
21 Jan	"New Look" defense budget unveiled in Eisenhower message to Congress
21 Jan	USS NAUTILUS, first atomic-powered submarine, launched at Groton, Conn.
1 May	Public display in Moscow of significant numbers of TU-16 Badger medium bombers and of a single Mya-4 Bison heavy bomber

1955

8 Feb	Bulganin replaced Malenkov as Premier, accompanied by expanding influence of Soviet military establishment and substantially increased defense budget
14 Feb	Killian Committee report delivered to President, urging acceleration of U.S. ballistic missile program
1 May	First public display of Soviet TU-95 Bear turboprop heavy bomber
6 May	West Germany joined NATO
14 May	Warsaw Pact created as counterbalance to NATO
Jun	NIKE AJAX surface-to-air missile system deployed by U.S.
18-23 Jul	Geneva summit conference; "open skies" policy proposed by Eisenhower

1956

14 Feb	Khrushchev denunciation of Stalin at 20th Party Congress
Jun	First U-2 flight over Soviet territory authorized by Eisenhower
Sep-Dec	Initial operational capability for Soviet SS-3 MRBM
Nov	Hungarian revolt crushed by Red Army

1957

5 Jan	Eisenhower Doctrine announced to combat aggression in Middle East
15 May	First thermonuclear device exploded by British
1 Aug	NORAD formed, establishing joint U.S.-Canadian command for operation of air defense of the continent
26 Aug	Soviet announcement of successful ICBM launch
4 Oct	Sputnik I launched by Soviet Union
7 Nov	Gaither Committee issued alarming report on Soviet capabilities and U.S. continental defense vulnerability

1958

31 Jan	First U.S. satellite launched at Cape Canaveral
Mar	NIKE-HERCULES surface-to-air-missile system deployed by U.S.
27 Mar	Khrushchev succeeded Bulganin as Premier
31 Mar	Six-month suspension of nuclear weapons testing announced by Soviet Union
May	First operational THOR IRBM accepted by U.S. Air Force
Mid-1958	Initial operational capability for Soviet SS-N-4 SLBM
Sep-Oct	Initial operational capability for Soviet SS-4-MRBM
31 Oct	Nuclear test ban negotiations opened in Geneva

Nov-Dec	U.S.S.R. deployment of high-level point defense SA-2 surface-to-air missile system

1959

27 May	Delivery of first operational U.S. SNARK intercontinental cruise missile
9 Sep	U.S. ATLAS ICBM became operational
15-27 Sep	Khrushchev visit to U.S; meeting with Eisenhower at Camp David; disarmament proposal offered to U.N.

1960

Jan-Apr	Initial operational capability for Soviet SS-6 ICBM
Jan	First Western observation of Soviet TU-22 Blinder supersonic medium bomber
14 Jan	Khrushchev "missile-rattling" speech to Supreme Soviet, coupling disarmament proposals with new military policy based on primacy of nuclear retaliatory power
13 Feb	Atomic device exploded by France
1 May	U-2 spy plane shot down over Soviet Union
17 May	Paris summit meeting broken up by Khrushchev
11 Jul	First operational U.S. JUPITER IRBM emplaced at an Italian missile base
20 Jul	Polaris missile successfully fired from submerged submarine
1 Aug	First U.S. B-58 supersonic bomber delivered to operational unit
11 Aug	First capsule recovery of a Discoverer research satellite
31 Oct	First operational U.S. TITAN ICBM accepted by Air Force
15 Nov	U.S. deployment of POLARIS A-1 SLBMs

1961

20 Jan	Kennedy President
Jan	U.S.S.R. deployment of low-level SA-3 surface-to-air missile system
3-4 Jun	Kennedy and Khrushchev meeting at Vienna; Khrushchev demanded withdrawal of West from Berlin
13 Aug	Berlin Wall built by East Germans; NATO military forces increased in response
1 Sep	Soviet Union resumption of nuclear tests with explosion of megaton weapons; U.S. followed
Sep-Dec	Initial operational capability for Soviet SS-5 MRBM
21 Oct	"Missile gap" myth disposed of by U.S. Deputy Secretary of Defense Gilpatric in speech
25 Nov	USS ENTERPRISE, first atomic-powered aircraft carrier, commissioned

1962

Jan	Initial operational capability for Soviet SS-7 ICBM
26 Jan	U.S. deployment of POLARIS A-2 SLBMs
14 Mar	Geneva Disarmament Conference opened, attended by 18 nations
Jun	First operational MINUTEMAN ICBM accepted by U.S. Air Force
16 Jun	Secretary of Defense McNamara Ann Arbor, Mich., speech stating principal U.S. objective in the event of nuclear war should be destruction of enemy's military forces rather than civilian population
Oct-Nov	Cuban missile crisis
21 Dec	Cancellation of SKYBOLT missile program announced by Kennedy and British Prime Minister Macmillan

1963

30 Jan	U.S. announcement of withdrawal of JUPITER IRBMs from Turkey and Italy
10 Jun	Kennedy American University speech calling for end to Cold War
20 Jun	Agreement to establish "hot-line" between White House and Kremlin
5 Aug	Treaty to ban all but underground testing of nuclear weapons signed by U.S. and Soviet Union
Sep-Dec	Initial operational capability for Soviet SS-N-5 SLBM
Nov	Initial operational capability for Soviet SS-8 ICBM
22 Nov	Kennedy assassinated; Johnson President

1964

21 Jan	Disarmament Conference reconvened at Geneva
27 Jan	McNamara advocacy before House Armed Services Committee of a damage limiting capability as a strategic goal, citing a "cities-only" force as dangerous and a "first-strike" force as impossible
1 May	Soviet SA-4 missile first seen by Western observers in Moscow parade
28 Sep	U.S. deployment of long-range POLARIS A-3 SLBMs
15 Oct	Khrushchev replaced by Brezhnev as First Secretary and by Kosygin as Premier
16 Oct	Detonation of nuclear device by Red China

1965

2 Feb	McNamara posture statement introduced "assured destruction" concept signaling shift in emphasis from "damage limitation" strategy

1966

Jan-Apr	Initial operational capability for Soviet SS-9 ICBM
Jan-Apr	Initial operational capability for Soviet SS-11 ICBM
9 Mar	Withdrawal by France of its armed forces from NATO command

1967

Jan	U.S.S.R. deployment of high altitude area defense SA-5 surface-to-air system
5-10 Jun	Six-day Arab-Israeli war
17 Jun	Announcement of test of H-bomb by Red China
23-25 Jun	Glassboro, N.J., summit conference between Johnson and Kosygin

1968

Aug	Initial operational capability for Soviet GALOSH 1-B anti-ballistic missile system around Moscow
20-21 Aug	Soviet occupation of Czechoslovakia
24 Aug	Test of H-bomb by France
26 Sep	Pravda announcement of "Brezhnev Doctrine" asserting right of Soviets to intervene in Communist countries

1969

Jan-Apr	Initial operational capability for Soviet SS-N-6 SLBM
20 Jan	Nixon President
27 Jan	Nuclear "sufficiency" rather than "superiority" stressed by Nixon
6 Feb	U.S. decision to halt SENTINEL deployment
14 Mar	Plans for a reduced ABM system under the name SAFEGUARD announced by Nixon

20 Jul	U.S. APOLLO 11 landed on moon
8 Oct	First U.S. FB-111 delivered to operational unit
17 Nov	Preliminary SALT talks between U.S. and Soviet Union opened in Helsinki

1970

5 Mar	Nuclear nonproliferation treaty, signed by 62 nations, entered into force

1971

11 Feb	Seabed Treaty signed in Washington, Moscow, and London, banning installation of nuclear weapons on ocean floor
30 Mar	U.S. deployment of POSEIDON SLBMs
25 Dec	First sea launch of Soviet SS-N-8 SLBM

1972

14 Mar	First U.S. detection of flight test of Soviet SS-16 ICBM
22-29 May	Nixon visit to Soviet Union; signing of SALT I treaty on limitation of ABM systems and interim agreement on limitation of strategic offensive weapons
15 Sep	First U.S. detection of flight test of Soviet SS-17 ICBM
Oct	First U.S. detection of flight test of Soviet SS-18 ICBM

HISTORY OF STRATEGIC ARMS COMPETITION, 1945-1972

APPENDIX 2

U.S. NOTABLES

SOURCES:

Department of Defense Fact Sheet, Assistant Secretary of Defense Public Affairs, 1976

Who's Who in America, 1972-1973, Marquis Publications, Chicago, Ill.

Congressional Directory, 79th-92nd Congresses, U.S. Government Printing Office

Biographical Directory of the American Congress, 1774-1971

U.S. NOTABLES

Dean G. Acheson was an Assistant Secretary of State, 1941-45, Under Secretary of State, 1945-47, and Secretary of State, 1949-53.

Sherman Adams was a member of Congress from New Hampshire, 1945-47, Governor of New Hampshire, 1949-53, and assistant to President Eisenhower, 1953-58.

Clinton P. Anderson, U.S. Senator from New Mexico, 1949-73, was a prominent member of the Joint Committee on Atomic Energy in the 1950s and 1960s.

Adm. George W. Anderson was Chief of Naval Operations, 1961-63.

R. Owen Brewster, from Maine, served in the House of Representatives, 1935-41, and the Senate, 1941-53. He was the leader of a legislative committee on Air Power in 1948.

Harold Brown was Director of Defense Research and Engineering 1961-65, Secretary of the Air Force, 1965-69, and became Secretary of Defense in 1977.

McGeorge Bundy was special assistant to Presidents Kennedy and Johnson for National Security Affairs from 1961 to 1965.

Admiral Arleigh A. Burke served as Chief of Naval Operations from 1955 until 1961.

Clarence A. Cannon, from Missouri, served in the House of Representatives from 1923 to 1964. He was Chairman of the House Appropriations Committee in 1941-47, 1949-53, 1955-64.

Admiral Robert B. Carney was Chief of Naval Operations from 1953 to 1955.

Clark Clifford was special counsel to President Truman from 1946 to 1950 and served as Secretary of Defense under President Johnson in 1968-69.

Gen. J. Lawton Collins was U.S. Army Chief of Staff, 1949-53.

Robert Cutler was Special Assistant for National Security Affairs to President Eisenhower, 1953-55, 1957-58.

Allen W. Dulles, brother of John Foster Dulles, was Director of the Central Intelligence Agency, 1953-61.

John Foster Dulles was Secretary of State 1953-59 during the Eisenhower administration.

Ferdinand Eberstadt was appointed by Secretary of Defense Forrestal to head a committee, as part of the Hoover commission, to review the workings of the 1947 National Security Act. The committee's report was published in 1948.

Alain Enthoven served under Secretary of Defense McNamara as Deputy Assistant Secretary of Defense for Systems Analysis, 1961-65, when he was promoted to Assistant Secretary of Defense, Systems Analysis, serving until 1969.

Dwight D. Eisenhower was U.S. Army Chief of Staff, 1945-48, adviser to the Secretary of Defense in 1949, Supreme Commander of NATO forces, 1950-52, President, 1953-61.

Thomas K. Finletter headed President Truman's Air Policy Commission in 1948, was Secretary of the Air Force, 1950-53, U.S. Ambassador to NATO, 1961-65.

James V. Forrestal was Secretary of the Navy, 1944-47, and in September 1947 became the first Secretary of Defense, serving until March 1949.

H. Rowan Gaither, Jr., President, Ford Foundation, served as Chairman of the Gaither Committee in 1957.

Trevor Gardner, a Special Assistant to Secretary of the Air Force Harold Talbott, 1953-55, headed a special study group in 1953 on

guided missiles and served as Assistant Secretary of the Air Force for Research and Development in 1955-56.

Thomas Gates was Secretary of the Navy, 1957-59, Deputy Secretary of Defense in 1959, and Eisenhower's last Secretary of Defense, 1959-61.

Roswell Gilpatric was Under Secretary of the Air Force, 1951-53, and Deputy Secretary of Defense under McNamara, 1961-64.

Gen. Andrew J. Goodpaster, U.S. Army, was defense liaison officer and staff secretary to President Eisenhower, 1954-61. He served as Supreme Allied Commander, Europe from 1969 to 1974.

Lt. Gen. Hubert R. Harmon, USAF, headed a JCS committee in 1949 that prepared the Harmon Report, an analysis of strategic bombing.

Charles J. Hitch was Assistant Secretary of Defense, Comptroller, 1961-65.

Lt. Gen. Thomas F. Hickey, U.S. Army, in 1959 headed a targeting study for the NSC.

Lt. Gen. John E. Hull, U.S. Army, was the first Director of the Weapons Systems Evaluation Group. He headed a committee which prepared "WSEG #1", a report on the use of atomic weapons.

George M. Humphrey was Secretary of the Treasury under President Eisenhower, 1953-57.

Henry M. Jackson, U.S. Senator from Washington, 1953- , was a member Joint Committee on Atomic Energy.

Louis Johnson followed Forrestal as Secretary of Defense, serving from March 1949 to September 1950.

James R. Killian, Jr., President of the Mas
Institute of Technology, served as Special Assis
dent for Science and Technology, 1957-59.

General Curtis E. LeMay was Commander in Chi
tegic Air Command, 1948-57, Vice Chief of Staff,
Chief of Staff, 1961-65.

David E. Lilienthal was chairman of the Ato
in the Truman administration, 1946-50.

Robert A. Lovett served under General Marsh
Secretary of State, 1947-49, and as Deputy Secret
1950-51. He served as Secretary of Defense, 195

George H. Mahon, Congressman from Texas beg
was Chairman of the House Defense Appropriations
the 1940s and 1950s, and was Chairman of the
priations Committee, 1964-77.

General George C. Marshall was Chief of Sta
during World War II, Secretary of State, 1947-49.
Defense during the Korean War, 1950-51.

Neil McElroy was the second of President Eis
Secretaries of Defense, 1957-59.

Brien McMahon, Senator from Connecticut, 194
the McMahon Act for control of atomic energy (Atom
1946) and a leader on atomic matters in the Congr

Robert S. McNamara was Secretary of Defense
Johnson administrations, 1961-68.

Wilfred J. McNeil was the first Assistant Se
Comptroller, 1949-59.

Richard M. Nixon served as Congressman from California, 1947-51, Senator, 1951-53, Vice-President, 1953-61, President, 1969-74.

Paul H. Nitze was Chairman of the State Department Policy Planning Council, 1950-53, Assistant Secretary of Defense for International Security Affairs, 1961-63, Secretary of the Navy, 1963-67, Deputy Secretary of Defense, 1967-69, and a member of the U.S. SALT delegation, 1969-74.

General Thomas S. Power succeeded General LeMay as Commander in Chief of SAC in 1957 and served until 1964.

Admiral William F. Raborn was the first director of the Navy's Fleet Ballistic Missile Program, director of the Office of Special Projects for the Polaris program, and Deputy Chief of Naval Operations. He served as Director of the CIA, 1965-66.

Admiral Arthur W. Radford was the first naval officer to become chairman of the Joint Chiefs of Staff, serving from 1953 to 1957.

Admiral Hyman G. Rickover, a leader in the development of nuclear propulsion systems for naval vessels, has headed atomic submarine development in the Bureau of Ships, U.S. Navy, since 1947.

General Matthew B. Ridgway replaced Eisenhower in 1952 as Supreme Allied Commander in NATO, and became Army Chief of Staff in 1953 for a two-year term.

L. Mendel Rivers served as Congressman from South Carolina, 1941-70, and was Chairman, House Armed Services Committee, 1965-70.

Walt W. Rostow was Deputy Special Assistant to President Kennedy for National Security Affairs in 1961, Chairman of the Policy Planning Council of the Department of State, 1961-66, and Special Assistant to President Johnson, 1966-69.

Richard B. Russell, Jr., was Senator from Georgia, 1933-71, and chairman of the Senate Armed Services Committee, 1951-53 and 1955-68.

General Bernard A. Schriever, USAF, took command on 1 July 1954, of the newly formed Western Development Division of Air Research and Development Command. He commanded ARDC (which in 1961 became Air Force Systems Command) from 1960 to 1966.

Admiral Forrest P. Sherman became Chief of Naval Operations in 1949 and served until his death in 1951.

Gerard C. Smith was special assistant to the Secretary of State for atomic affairs, 1954-57, Assistant Secretary of State, 1957-61, director of the Arms Control and Disarmament Agency, 1969-72, and Chief of U.S. delegation at strategic arms limitation talks, 1969-72.

General Walter Bedell Smith was appointed Ambassador to Russia in 1946, was Director of Central Intelligence, 1950-53, and was Under Secretary of State, 1953-54.

Harold E. Stassen, Governor of Minnesota, 1930-43, was special assistant to President Eisenhower, with cabinet rank, to direct studies of U.S. and World disarmament from 1955 to 1958.

Lewis L. Strauss was special assistant to President Eisenhower on atomic energy matters in 1953, and served as Chairman of the Atomic Energy Commission, 1953-58.

W. Stuart Symington was Secretary of the Air Force from 1947 to 1950. In 1953 he entered the Senate as a Democrat from Missouri. As a member of the Armed Services Committee, he conducted Air Power hearings in 1956.

Robert A. Taft served as Senator from Ohio, 1939-53. He was a major figure in the Senate and in the Republican Party throughout his political career.

Harold Talbott was Secretary of the Air Force, 1953-55.

General Maxwell Taylor was Army Chief of Staff, 1955-59, special assistant to the President, 1961-62, and Chairman, Joint Chiefs of Staff, 1962-64.

General Nathan F. Twining was Chief of Staff of the Air Force, 1953-57, and Chairman, Joint Chiefs of Staff, 1957-60.

Arthur H. Vandenberg served as Senator from Michigan, 1928-51 and Chairman of the Senate Foreign Relations Committee, 1947-49.

Carl Vinson served as Congressman from Georgia, 1914-65, and Chairman of the House Armed Services Committee, 1949-53 and 1955-64.

Werner Von Braun, German rocket engineer, headed the Army missile team at the Redstone Arsenal in the development of the Jupiter IRBM in the late 1950s.

John Von Neumann, a mathematician, headed the Strategic Missile Evaluation Committee for the Secretary of the Air Force in 1953-54.

Jerome Wiesner served as a technical adviser to the Gaither Committee in 1957 and was the President's Science Adviser, 1961-64.

Charles E. Wilson served as Secretary of Defense, 1953-57.

HISTORY OF STRATEGIC ARMS COMPETITION, 1945-72

APPENDIX 3

U.S.S.R. NOTABLES

SOURCES:

CIA

Prominent Personalities in the USSR, The Institute for the Study of the USSR, Scarecrow Press Inc., Munich, Germany, 1969

Who was Who in the USSR, 1965-1966, 1961-1962, The Institute for the Study of the USSR, Scarecrow Press Inc., Munich, Germany, 1966, 1962

Russia's Rulers--the Khrushchev Period, Facts on File, New York, 1971

Khrushchev Remembers, translated and edited by Strobe Talbott, Little, Brown, and Company, Inc., Boston, 1970

U.S.S.R. NOTABLES

ANTONOV, ALEKSEI

Aleksei Antonov, Soviet Army General, was Chief of Staff of the Soviet Army at the end of World War II, and attended the Yalta and Potsdam conferences. He was one of 11 military leaders to receive the highest Soviet military decoration - the Order of Victory. From 1955 to 1962 he was first deputy chief of the USSR Armed Forces General Staff.

BELOV, PAVEL A.

Pavel A. Belov, Colonel General in the Soviet Army, commanded the 49th Army in World War II. From 1955 to 1960 he was chairman of the Central Committee of DOSAAF, which had the responsibility for civil defense. After 1972 civil defense was given equal status with other services, and its chief held the post of deputy minister of defense.

BERIA, LAVRENTY P.

Lavrenty P. Beria headed the NKVD from 1938 to 1945 as Stalin's security chief and was a Politburo member from 1946 to 1953 when he was purged and executed four months after Stalin's death. At the beginning of World War II, Stalin appointed Beria to the State Defense committee (along with Molotov, Voroshilov, and Malenkov) and put him in charge of domestic policy. The day after the atomic bomb was dropped on Hiroshima, Stalin designated Beria to supervise a Soviet version of the Manhattan Project, which culminated in a nuclear explosion in August 1949.

BIRYUZOV, SERGEI S.

Sergei S. Biryuzov was a high level Army battle commander in World War II. In 1955 he became commander-in-chief of the National Air Defense troops (PVO Strany) and a deputy minister of defense. He was promoted to Marshal and rose to become Chief of the General Staff of the Armed Forces in 1963. He was killed in 1964 in a plane crash near Belgrade.

KUZNETSOV, NIKOLAI G.

Nikolai G. Kuznetsov, Admiral of the Soviet Navy, was commander-in-chief of Soviet Naval Forces during World War II. After the war, he was First Deputy Minister of Defense as well as Commander-in-Chief of the Navy, until Stalin demoted him in 1947. He was reinstated as head of the navy in 1951. In 1956, he alienated Khrushchev by urging expansion of the surface fleet and was dismissed as chief of naval forces and demoted to vice-admiral.

LAVOCHKIN, SEMYON A.

Semyon A. Lavochkin was described in Russia as one of the most remarkable representatives of the new Soviet generation of engineers. He achieved fame for his World War II fighter plane designs, but later expanded into missiles. He initially worked under A. N. Tupelov in the late 1920's, and while in prison in 1937 he collaborated with V.P. Gorbunov and M.I. Gudkov on a series of aircraft under the designation of LaGG. After 1943, the team separated and his designs became known as the La series.

MALENKOV, GEORGY M.

Georgy M. Malenkov became both First Secretary and Premier after the death of Stalin in 1953. As spokesman for the new regime, he inaugurated a new economic course to increase production of consumer goods. He was the first to publicly suggest a type of "peaceful coexistence." Malenkov was outmaneuvered and outvoted by Khrushchev and relinquished his premiership in 1955, being succeeded by Bulganin. He was eclipsed once and for all in 1957.

MALINOVSKY, RODION Y.

Rodion Y. Malinovsky, an outspoken military commander and a favorite with rank and file troops and commissars alike, distinguished himself in World War II and was promoted to Marshal of the Soviet Union in 1944. He served as Minister of Defense from 1957 to 1967, during which time he directed the modernization of the Soviet armed forces and their armament with missiles.

MALYSHEV, VYACHESLAV A.

Vyacheslav A. Malyshev, served as the Minister of Medium Machine Building from 1953 to 1955. In this position he was reputed to be the successor to Beria as the head of the Soviet atomic energy programs. After 1955, he became chairman of the state committee for new technology of the Council of Ministers.

MENSHIKOV, MIKHAIL A.

Mikhail A. Menshikov had two careers--one in foreign trade and the other in the foreign service. From 1946 to 1953 he was Deputy Minister of Foreign Trade, from 1953 to 1957 he was ambassador to India, and from 1958 to 1961 he was Ambassador to the United States.

MIKOYAN, ANASTAS I.

Anastas I. Mikoyan had the longest record of political survival in the Kremlin. An old time party member, he joined the Bolsheviks in 1915, and was an early ally of Stalin. Foreign trade was his specialty from the time he was appointed Commissar of International Trade in 1926. He was a member of the Politburo from 1935 to 1966. He was the only member of the Old Guard to survive Khrushchev's assault on the anti-party group in 1957, and one of the few "old Bolsheviks" to withdraw from high position without mishap or disgrace.

MIKOYAN, ARTEM I.

Artem I. Mikoyan, a designer general with the Ministry of Aviation Industry, teamed with M.I. Gurevich to design MIG fighters. The MIG team was formed in 1938, providing the MIG-1 in 1939, and their first modern jet fighter, the MIG-15, in 1947. Mikoyan was the brother of Anastas Mikoyan.

MOLOTOV, VYACHESLAV M.

Vyacheslav M. Molotov was the USSR Minister of Foreign Affairs from 1939 to 1949, and again from 1953 to 1956. He was one of the few Bolsheviks with a bourgeois background to attach himself to Stalin from the very early days. He was a principal exponent of a hard line foreign policy in the first days of the cold war. In 1957 he was removed from office and membership in the Central Committee, CPSU, for anti-party activities as a member of the anti-Khrushchev group.

MOSKALENKO, KIRILL S.

Kirill S. Moskalenko, Marshal of the Soviet Union, was one of the field commanders who helped capture the Ukraine in World War II. He commanded the Moscow military district from 1953 to 1960 and was commander-in-chief of the USSR Missile Forces from 1960 to 1962 and a deputy minister of defense, 1960-64 and after 1966. He was made Chief Inspector for the Ministry of Defense in 1962.

MYASISHCHEV, VLADIMIR M.

Vladimir M. Myasishchev, an aircraft designer, worked with the Tupelov Design Bureau in the 1930's and was director and chief designer of the Myasishchev Experimental Design Bureau 1948-61. He was one of a select group of aircraft designers the Soviets have honored for their many contributions to the industry. He is known primarily for his two large bombers, the Bison (1954) and the Bounder (1958).

NEDELIN, MITROFAN I.

Mitrofan I. Nedelin was the artillery officer most frequently identified among high ranking officials of the USSR Ministry of Defense in 1952 when he became a deputy minister of defense and was elected a candidate member of the CPSU Central Committee. He was raised to the rank of Marshal of Artillery in 1953, when he and P.F. Zhigazev became the first officers to be promoted to marshal since 1947. In 1959 he became the first commander of the Soviet Rocket Forces. He was reported to have been killed in a plane crash in 1960; however, other reports indicate that he was killed in an explosion during a test launch of the SS-7 ICBM.

NOVIKOV, ALEKSANDR A.

Aleksandr A. Novikov, was Commander-in-Chief of the Soviet Air Force, 1942-46, and was promoted to Marshal of the Air Force in 1944. His main task was the restoration of the Soviet Air Force after its almost complete destruction by the Germans at the beginning of World War II. He was arrested and jailed after the war for having accepted defective airplanes.

NOVIKOV, VLADIMIR N.

Vladimir N. Novikov worked for more than 15 years in the defense and armaments industries before transferring, in the late 1950's, to posts in the field of economic planning. He was a Deputy Premier from 1960 to 1962 while heading the USSR State Planning Committee (Gosplan). His career suffered a reverse during Khrushchev's latter years in power, but in 1965 he was again elevated to the position of Deputy Premier.

PERVUKHIN, MIKHAIL G.

Mikhail G. Pervukhin, a technocrat minister who rose rapidly to the top in Stalin's last years, was Deputy Chairman of the Council of Ministers, 1950-55, and was a member of the Politburo, 1952-57. He was associated with the anti-party group which tried unsuccessfully to oust Khrushchev in 1957. In 1966, he became a member of the USSR State Planning Committee (Gosplan).

PONOMARENKO, PANTELEYMON K.

Panteleymon K. Ponomarenko, a career diplomat, was Secretary and a member of the Politburo of the Central Committee, CPSU 1952-53. He was the USSR permanent delegate to the International Atomic Energy Agency in Vienna in 1967 and also served as Ambassador to Poland, India, and the Netherlands.

SHAKHURIN, ALEKSEI I.

Aleksei I. Shakhurin, an aviation engineer and communist party worker, was the Peoples Commissar of Aviation Industry during World War II. He was abruptly removed in 1945, and later imprisoned for allegedly allowing production of defective airplanes during the war. He returned to public notice after Stalin died, and in 1953 became the First Deputy Minister of Aviation Industry.

SHEPILOV, DMITRI T.

Dmitri T. Shepilov, a specialist in political economics, worked under Khrushchev as Political Commissar during World War II. After the war, he headed the Department of Propaganda and Agitation, was Chief Editor of Pravda, and was made a candidate Politburo member of the Central Committee. In 1957 he was accused of anti-party activities and removed from the Central Committee.

SHTEMENKO, SERGEI M.

Sergei M. Shtemenko served from 1948 to 1952 as Chief of General Staff of USSR Armed Forces, and USSR deputy minister of armed forces, with rank of General of the Army. When Stalin died, he was demoted and vanished from public view. He reappeared as a Lieutenant General in 1956 and in 1965 was made deputy chief of the General Staff.

SMIRNOV, LEONID V.

Leonid V. Smirnov became Deputy Chairman of the Council of Ministers in 1963, and by virtue of his position as Chairman of the Military-Industrial Commission he was the top government official responsible for the Soviet defense industry. Long involved with missile and space activities, he was chairman of the State Committee for Defense Technology from 1961 to 1963. In 1961 he was elected directly to voting membership in the Central Committee of the CPSU, by-passing non-voter status.

SOKOLOVSKY, VASILY D.

Vasily D. Sokolovsky, an outstanding Soviet Army staff officer and field commander, was by spring of 1960 one of only two Soviet marshals left on the active list who had not worked with Khrushchev during World War II. Retired by the end of the year, they both (the other was I.S. Konev) returned to help Khrushchev in the 1961 Berlin crisis. Sokolovsky edited 3 editions of Military Strategy, which were published in 1962, 1963, and 1967, and were regarded as the most ambitious treatment of doctrine and strategy ever attempted in the Soviet Union.

STALIN, JOSEPH

Joseph Stalin, a Marxist revolutionary in 1894 at the age of 15, became General Secretary of the Central Committee in 1922, a position he used to gain sole dominance of the Party after the death of Lenin in 1924. In 1941, he assumed the office of Premier; he became chairman of the State Defense Committee during World War II. He has been credited with initiating programs of research and development that ultimately gave the Soviet Union aircraft and missile delivery systems of intercontinental range. Stalin died in 1953.

SUDETS, VLADIMIR A.

Vladimir A. Sudets was an experienced pilot who commanded both fighter and bomber units in the 1930's and 1940's. He was promoted to Marshal of the Air Force in 1955. From 1955 to 1962 he was commander of Strategic Air Forces and from 1962 to 1966 he was commander-in-chief of USSR Anti-Aircraft Defense Forces (PVO Strany) and USSR Deputy Minister of Defense.

SUKHOI, PAVEL O.

Pavel O. Sukhoi was an airdraft designer. He was mainly concerned with reconnaissance and bomber aircraft. The SU-2 bomber came out in 1939,and the SU-14 twin jet bomber appeared in 1954. After 1955 Sukhoi worked on long range bomber designs as Director of the Joint Design Bureau under the State Committee for Aviation Engineering.

SUSLOV, MIKHAIL A.

Mikhail A. Suslov was the leading theoretician of the Soviet Communist Party and one of the top ideologists in the world communist movement. He became a member of the Central Committee, CPSU, in 1941, was Chief Editor of Pravda, 1949-1950, and became a voting member of the Politburo in 1955.

TUPELOV, ANDREI N.

Andrei N. Tupelov was a leading figure in Soviet aircraft design for over 50 years, and supervised the design of over 100 successful types of aircraft. While in prison in the late 1930's, he designed a bomber which went into production in 1939. His best known designs were the TU-4 (a copy of the B-29), the turboprop TU-95 Bear, which provided intercontinental bombing capability, and the TU-114 turboprop airliner. He was one of the few prominent Soviets who never joined the Communist Party. He went into semi-retirement in the mid 1960's and turned over most of his design work to his son, A.A. Tupelov, who was working on the TU-144 supersonic jet transport.

UMANSKY, NAUM L.

Naum L. Umansky was a propulsion specialist associated with the development of medium-range missiles. In 1948-1949 he worked under S. P. Korolev, a designer of space rocket systems. Earlier, he was Chief of Propulsion at a scientific research institute. His career ended abruptly in 1950 when he was reportedly removed from his post during an anti-semitic purge.

USTINOV, DMITRY F.

Dmitry F. Ustinov was appointed Minister of Defense on April 29, 1976, to replace Andrei Grechko who had died three days earlier. Ustinov had been manager of the Soviet armaments and space programs for over 30 years. Ustinov's appointment broke the pattern since 1955 of selecting a defense minister from the ranks of the professional military. In July 1976, he was promoted to Marshal of the Soviet Union.

VASILEVSKY, ALEKSANDR M.

Aleksandr M. Vasilevsky was Chief of General Staff, USSR Armed Forces in World War II. An accomplished strategist skilled in the coordination of various arms and services, his rise in World War II has been termed the most rapid in Soviet military history - from Major General to Marshal in three years. After the war, he served as Minister of Defense from 1950 to 1953 and was one of a few professional soldiers accorded membership on the CPSU Central Committee in 1952.

VERSHININ, KONSTANTIN A.

Konstantin A. Vershinin was commander-in-chief of the USSR Air Force from 1946 to 1949. From 1953 to 1954 he was Commander of the USSR Anti-Aircraft Defense Forces, and in 1957 he was again commander-in-chief of the Air Force and became a deputy minister of defense. He was promoted to Chief Air Marshal in 1959.

VISHINSKY, ANDREI Y.

Andrei Y. Vishinsky was state prosecutor for Stalin in the 1930's. He was Deputy Minister of Foreign Affairs from 1946 to 1949 and from 1953 to 1954, and was Minister of Foreign Affairs from 1949 to 1953. In these posts he represented the Soviet government at numerous major conferences and meetings, including Yalta and Potsdam.

VOROSHILOV, KLEMENTY Y.

Klementy Y. Voroshilov was promoted to Marshal of the Soviet Union in 1935. He was a political general rather than a professional soldier. From 1934 to 1940 he was the USSR People's Commissar for Defense. He was blamed by Stalin for USSR humiliation by the Finns in 1939-1940 but was kept around in the war cabinet. On the death of Stalin, he was elected chairman of the Presidium of the Supreme Soviet.

VOSNESENSKY, NIKOLAI A.

Nikolai A. Vosnesensky's star rose quickly in the 1930's and 1940's. He became chairman of the USSR State Planning Committee (Gosplan) in 1937, was selected for membership in the Central Committee of the CPSU in 1939, and became a member of the Politburo in 1947. In 1949, during a large scale purge of the Leningrad party apparatus and of A.A. Zhdanov's supporters, Vosnesensky was removed from all party and government posts and executed the following year.

YAKOVLEV, ALEKSANDR S.

Aleksandr A. Yakovlev was one of the most influential designers in the history of Soviet aviation. In 1934 he was chief designer, then director of his own experimental design bureau. His primary areas of interest have been combat aircraft, light transport vehicles, and helicopters. He designed the first Soviet jet, the Yak-15, and subsequently designed a series of supersonic aircraft.

YAKOVLEV, NIKOLAI D.

Nikolai D. Yakovlev, Marshal of Artillery, a deputy minister of the armed forces in 1948 and 1953-58, held various posts within the Ministry of Defense. From 1958 to 1961 he was First Deputy Commander in Chief, USSR Anti-Aircraft Defense Forces (PVO Strany).

YANGEL, MIKHAIL K.

Mikhail K. Yangel was publicly identified only as a director of a scientific research institute, but it was speculated that he was a space engineering specialist and probable successor to Sergei Korolev as chief designer of the Soviet space program. His obituary in 1971 was signed by a large number of important political and government figures, indicating that Yangel was one of the more prominent members of the Soviet missile-space engineering establishment.

ZHDANOV, ANDREI A.

Andrei A. Zhdanov was generally considered the leading candidate to succeed Stalin as Russia's ruler. He was in the revolutionary movement from 1912, was elected to the Central Committee Secretariat in 1934, and was a member of the Politburo from 1939. From 1946 until his death in 1948, he was Stalin's right hand man.

ZHIGAREV, PAVEL F.

Pavel F. Zhigarev was made commander-in-chief of the Soviet Air Force in 1949 and in 1953 became a deputy minister of defense. In 1955 he was promoted to Chief Marshal of Aviation. He was prominent in Soviet aviation from the 1930's but his reputation was mainly for political intrigue, with little or no experience in large-scale combat operations.

ZHUKOV, GEORGY K.

Georgy K. Zhukov, Marshal of the Soviet Union and World War II hero, was Stalin's most outstanding military commander. He is credited with having prepared the strategy of the Red Army's major defensive and offensive victories against Germany. In 1946 he was banished by Stalin to a series of regional commands. Khrushchev brought him out of obscurity and in 1955 made him Minister of Defense, the first time a professional soldier had been put in charge of the armed forces. He became a full member of the Politburo in 1957 for his help to Khrushchev in his narrow victory over the "anti-party group," but four months later he was dismissed as Defense Minister and as a member of the Politburo.

HISTORY OF STRATEGIC ARMS COMPETITION, 1945-1972

APPENDIX 4

DESCRIPTION OF OPERATIONAL U.S. STRATEGIC WEAPON SYSTEMS, 1945-1972

SOURCES:

U.S. Air Force, History of Strategic Arms Competition, 1945-1972, Volume 2, "A Handbook of Selected U.S. Weapon Systems," June 1976 (S)

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LAND BASED STRATEGIC MISSILES

SM-62 SNARK

(S) SNARK was a subsonic intercontinental cruise missile launched by two rocket boosters and powered by a turbojet engine, which flew at 5,000 feet for 5,000 miles. Research and development began in 1946. Between 1953 and 1957 SNARK underwent extensive testing that culminated in a successful flight of 4,400 nautical miles. A SNARK wing was activated at Presque Isle AFB in 1959 and the first SNARK went on alert in March 1960. The entire wing of 30 SNARKs became operational in February 1961 but was inactivated in June of the same year.

(S) SNARK's demise was the result of a number of factors. Development problems, primarily with the celestial navigation and terminal dive systems, caused major delays in availability and large slippages in production and operational schedules. As a result, SNARK was in effect overtaken by the ATLAS and TITAN missiles, both of them having more promising performance characteristics.

(S/RD)		
	Year in service	1961
	Cruise speed	Mach 0.9
	Accuracy (CEP)	[redacted]
	Launch site	Soft
	Warhead Yield	[redacted]

SM-65 ATLAS

(S) The first American ICBM, ATLAS was a one-and-one-half stage liquid fueled guided missile designed to deliver a warhead at a range of 5,500 nm. with a two nautical mile CEP. Development of an ICBM dated from 1946 when Consolidated-Vultee (Convair) was awarded a contract to explore the theoretical and design problems of a large guided missile capable of reaching targets at intercontinental range. Though the contract was cancelled in 1947, Convair continued to work on the problem with its own funds. In 1951 the Air Force revived the ICBM program, and arranged with Convair to develop ATLAS. After several abortive tries, ATLAS was successfully test-flown in December 1957. The first operational ATLAS was delivered to the Air Force in February 1959 and it went on alert in September. The last of 13 ATLAS squadron was activated in June 1965.

SM-65 ATLAS (Contd.)

(S) Six versions of ATLAS were developed. Series "A", "B", and "C" were test vehicles. The first operational configuration was series "D". Series "E" incorporated major design improvements including higher thrust, all-inertial guidance, and an ablative reentry vehicle. The improvements in Series"F" were a prolonged storage fuel system, penetration aids, and a hardened silo launch system.

(S/RD)

	Series D	Series E	Series F
Year in service	1960	1961	1962
Range	5,500 nm.	5,500 nm.	5,500 nm.
Guidance	Radio-Inertial	All-Inertial	All-Inertial
Accuracy (CEP)	[redacted]		
Launch site	Soft	Coffin	Silo
RV Weight	2,400 lb.	3,900 lb.	3,900 lb.
Warhead yield	[redacted]		

SM-68 TITAN

(U) TITAN was a two-stage liquid-propellant ballistic missile designed to deliver a nuclear warhead against intercontinental targets. Development of TITAN was authorized in 1955 as a backup system in case ATLAS proved unsuccessful. The TITAN program was upgraded to a status equal to that of ATLAS in April 1958. The first successful TITAN test flight took place on 6 February 1959.

(S) Two basic TITAN models were deployed, each with six squadrons. Both were deployed in underground silos. TITAN I, which was inactivated in 1965, used cryogenic propellant stored in tanks and loaded into the missile when the launch order was given. Employing the "cold launch" technique, TITAN I was raised to the surface for firing. The follow-on TITAN II was a larger missile with all-inertial guidance and non-cryogenic hypergolic propellant that was stored in the missile. TITAN II could be launched from inside the missile silo.

SM-68 TITAN (Contd.)

The six TITAN II squadrons remained operational into the 1980s.

~~(S/RD)~~	TITAN I	TITAN II
Year in service	1962	1963
Maximum range	5,500 nm.	5,500 nm.
Accuracy (CEP)	[redacted]	
Guidance	Ratio-Inertial	All-Inertial
Silo Hardness	150-200 psi	300 psi
Launch Conditions	Silo-Lift	In-Silo
Warhead Yield	[redacted]	

SM-80 MINUTEMAN

(U) MINUTEMAN was a three-stage ICBM that was developed as a result of solid propellant research initiated in the mid-1950s. The requirement for a more economical solid-fuel ICBM to replace the costly liquid-fuel systems was established in 1958. The first MINUTEMAN was test-launched in February 1961. IOC was achieved in 1963.

~~(S/RD)~~ Three variants of MINUTEMAN were deployed. MINUTEMAN I was followed in 1966 by MINUTEMAN II which possessed greater range, increased payload, improved accuracy, multiple target selection, and greater penetration capability. MINUTEMAN III was developed to provide increased flexibility of reentry vehicle and penetration aid deployment, increased missile survivability against nuclear attack while airborne, and increased payload. It carried three multiple independently targetable reentry vehicles (MIRVs) of [redacted] each.

(U) MINUTEMAN missiles--1,000 altogether--were deployed in unmanned, hardened, and dispersed underground launch silos located in the Continental United States. Launch control and monitoring of safety, security, and alert status of the missiles was provided remotely from a hardened underground launch-control center.

SM-80 MINUTEMAN (Contd.)

~~(S/RD)~~	NM I	MM II	MM III
Year in service	1963	1966	1970
Maximum range	5,500 nm.	7,500 nm.	7,500 nm.
Accuracy (CEP)	[redacted]		
Silo Hardness	100-300 psi	300 psi	300 psi
Warhead Yield	[redacted]		

SM-75 THOR

(U) THOR was a single-stage, liquid-fuel intermediate range ballistic missile, designed to deliver a nuclear warhead at ranges between 300 and 1,500 nm. Development began in 1955 and the first successful flight test followed in September 1957. Altogether 60 THOR missiles, in four squadrons, were deployed in the United Kingdom where they were operated by the Royal Air Force, beginning in 1959. The THOR squadrons were inactivated in 1963 and all missiles were returned to the United States. Their short operational life stemmed from two major factors: the necessity to fuel the missile immediately before launching and the unprotected, above-ground configuration of the launchers.

(U)		
	Year in service	1959
	Maximun range	1,500 nm
	Accuracy (CEP)	[redacted]
	Launch site	Soft
	Warhead yield	[redacted]

SM-78 JUPITER

(U) JUPITER was a single stage, liquid fuel intermediate range missile, developed by the Army. When development was first approved in 1955, JUPITER's intended primary purpose was as a ship-launched IRBM and secondarily as a back-up to the THOR. This changed in 1956, and JUPITER was continued as a land-based missile only. Successful flight testing in 1957 resulted in a decision to deploy the IRBM under Air Force responsibility. Two squadrons (each with fifteen JUPITER's) [redacted] in 1961-1962, where they were operated by their respective air forces. The three squadrons were inactivated in 1963, primarily for the same reasons as the THOR.

JUPITER (Contd.)

(U)	Year in service	1961
	Maximum range	1,500 nm
	Accuracy (CEP)	[redacted]
	Launch site	Soft
	Warhead yield	

LONG RANGE BOMBERS

B-29 SUPERFORTRESS

(U) Developed and used in World War II, the four-engine propeller-driven B-29 SUPERFORTRESS was the first combat aircraft to carry atomic weapons. Though originally designed for conventional bombing, many B-29s were refitted after World War II for atomic capability. B-29 production was terminated in 1946; they were retired from service in 1954.

(U) Four variants of the B-29 were developed. The B-29A differed from the original B-29 primarily in having improved engines, an increased fuel supply, and more guns and ammunition. The B-29B was specially equipped with radar for night-bombing. The B-29C, incorporating an engine-change, was cancelled before going into production. A fifth model, the B-29D, was redesignated the B-50. Data below refer to the B-29A, the standard model found in the Strategic Air Command after World War II. Performance characteristics are for basic mission.

(U)	Year in service	1944
	Takeoff weight	140,000 lb.
	Cruise speed	220 KT
	Service ceiling	24,000 ft.
	Combat radius (Max.)	1,678 nm.
	Bomb load	10,000 lb.

B-50 SUPERFORTRESS

(U) Superficially similar to the B-29, the B-50 (originally designated the B-29D) incorporated numerous changes, including improved engines, a taller tail which could be folded for hangar storage, and strengthened wings. The prototype for the B-50 was the XB-44, which was first test flown in 1945. About 370 B-50s were produced, the last in 1950. With the advent of the B-36 and the B-47, most B-50s were refitted for reconnaissance roles before being phased out in 1956. Performance characteristics are for basic mission.

(U)	B-50D
Year in service	1949
Gross weight	173,000 lb.
Cruise speed	212 kn
Service ceiling	24,000 ft.
Combat radius	2,082 nm.
Bomb load	10,000 lb.

B-36

(U) The B-36 was a long-range heavy bomber/reconnaissance aircraft capable of carrying both nuclear and non-nuclear weapons on intercontinental missions. Development of the B-36 began during World War II. The first test flight took place in June 1946, but because of numerous technical problems the B-36 did not become fully operational until 1951. Production was completed in 1953 and the last B-36 was retired in 1959.

(U) Efforts to solve the B-36's many technical difficulties resulted in development of nine different models. All retained the slightly swept-wing configuration of the original design. The B-36A -- the first production model -- was driven by six pusher propellers. Later models added two jet engines under each wing. Performance characteristics are for basic mission.

(U)	B-36H
Year in service	1952
Gross weight	370,000 lb.
Cruise speed	203 kn.
Target altitude	40,200 ft.
Combat radius	2,705 nm.
Bomb load	10,000 lb.

B-47 STRATOJET

(U) The B-47 was a high-speed swept-wing medium bomber powered by six jet engines and used by the Strategic Air Command. Though Boeing designed the basic aircraft, production of the B-47 was shared with Lockheed and the Douglas Aircraft Company. Test-flown in 1947 the B-47 was deployed in 1951 at bases in the United States. In 1953 deployment at oversea bases began. Production was terminated in 1957 and the last B-47 was retired to storage in 1967.

(U) Nine models of the B-47 were produced. The B-47A was used only for test purposes. The "B" and "E" variants constituted the bulk of the combat force; the latter in a heavy weight configuration could carry termonuclear weapons. Performance characteristics are for basic mission.

(U)

	B-47B	B-47E Heavy
Year in service	1951	1953
Gross weight	185,000 lb.	230,000 lb.
Cruise speed	433 kn.	435 kn.
Target altitude	38,800 ft.	37,350 ft.
Combat radius	1,704 nm.	2,050 nm.
Bomb load	10,000 lb.	10,000 lb.

B-52 STRATOFORTRESS

(U) A long-range heavy swept-wing jet bomber, the B-52 STRATOFORTRESS was designed and produced by the Boeing Company. Following test flights which began in 1952, the B-52 was deployed extensively with units of the Strategic Air Command. A total of 744 production STRATOFORTRESSES rolled off the assembly line between 1954 and 1962.

(U) The B-52 was produced in eight variants. The early B-52As were used only for flight testing. Production models carried various combinations of nuclear weapons, high explosive bombs, HOUND DOG and SRAM air-to-surface missiles, and QUAIL decoys. Data below compare the performance and characteristics of the first and last production models. Performance characteristics are for basic mission.

(U)

	B-52B	B-52H
Year in service	1955	1961
Gross weight	420,000 lb.	488,000 lb.
Cruise speed	453 kn.	453 kn.

STRATOFORTRESS (Contd)

	B-52B	B-52H
Target altitude	45,100 ft.	45,900 ft.
Combat radius	3,100 nm.	4,176 nm.
Bomb load	10,000 lb.	10,000 lb.

B-58 HUSTLER

(U) Though flight-tested in 1955, the B-58 delta-wing medium bomber was not declared combat ready until the early 1960s. Less than 100 of these aircraft were delivered to the Air Force before production was terminated in 1962. The last HUSTLER was retired to storage in January 1970.

(U) HUSTLER incorporated supersonic dash speed, and high altitude capability, but unstable handling characteristics caused it to accumulate a disappointing performance record. The only production model was the B-58A. Its characteristics for a basic high-altitude mission were as follows:

(U)	Year in service	1960
	Gross weight	163,000 lb.
	Cruise speed	503 kn.
	Combat speed	1,147 kn.
	Combat Service ceiling	65,000 ft.
	Combat radius refueled	2,960 nm.

FB-111

(U) The FB-111 was a twin-jet supersonic swing-wing medium bomber derived from the basic design used by General Dynamics for the F-111. Development of the FB-111 commenced in 1965 on orders from Secretary of Defense McNamara. Though intended as an interim system to replace the B-52 and B-58, the FB-111 fell victim to technical problems and cost overruns that raised doubts about its development. Between 1969 and 1971, SAC took delivery of about 70 FB-111As. Characteristics are for basic mission.

(U)	Year in service	1969
	Gross weight	110,646 lb.
	Average Cruise speed	444kn.
	Basic speed at 35,000 ft	1188 kn.
	Service ceiling	50,000 + ft.

FB 111 (Contd.)

Combat distance (refueled)	4,000 + nm.
Payload	8,988 lb.

CARRIER BASED ATTACK BOMBERS

AD SKYRAIDER

(U) The original design of the propeller-driven AD carrier attack bomber was submitted to the Navy in July 1944 as a replacement for the SBN dive bomber. An AD prototype flew for the first time in March 1945. The seven AD types were developed in 49 variants. In 1953 the Navy announced that the AD had acquired an atomic capability. Production of the SKYRAIDER was terminated in 1957.

(U)	Year in service	1945
	Weight	19,000 to 25,000 lb.
	Combat radius	1,500 nm.
	Maximum speed	365 mph at 15,000 ft.
	Service ceiling	25,000 ft.
	Bomb load	10,500 lb.

P2V NEPTUNE

(U) This patrol bomber was one of the most venerable planes in the Navy's inventory. The first P2V was ordered in April 1944. Between 1954 and 1957, most models used by the Navy were reequipped with auxiliary jet power. NEPTUNE's primary mission was developed around anti-submarine warfare (ASW) and mine-laying, though in the late 1940s some models underwent extensive modification to carry atomic weapons. These models, known as the P2V-3C, had to be loaded on to aircraft carriers with cranes; the carriers themselves required strengthened flight decks in order to accommodate the planes. Data below refer to the P2V-3C.

(U)	Year in service	1948
	Weight	75,000 lb. (approx.)
	Range (normal)	3,500 nm.
	Maximum speed	300 mph
	Service ceiling	27,000
	Bomb load	8,000 lb.

AJ SAVAGE

(U) The most striking feature of this carrier attack bomber was its composite power system which consisted of two piston engines under the wings and a single turbojet in the rear of the fuselage. Designed to carry nuclear weapons, the first prototype AJ flew on 2 July 1948. A production model was tested in the air in May 1949. Variants of the SAVAGE included the AJ-2, which first flew on 19 February 1953, and the AJ-2P, a photo-reconnaissance aircraft. Production of the AJ series was completed in 1954.

(U)	Year in service	1949
	Weight	50,000 lb. (approx.)
	Maximum speed	435 mph

A3D/A-3 SKYWARRIOR

(U) The A3D turbojet carrier attack bomber was operational on board aircraft carriers in the 1950s and 1960s. It could carry the largest type bombs, including nuclear weapons, and was used for high-altitude, high speed attack as well as low-level attack and mine laying operations. Redesignated the A-3 in the late 1950s, this aircraft was converted to photo-reconnaissance and tanker roles. The A3D prototype flew on 28 October 1952. The first production model was flight-tested in September 1953.

(U)	Year in service	1953
	Take-off weight	70,000 lb.
	Combat radius	1,150 nm. (approx.)
	Maximum speed	630 mph
	Service ceiling	45,000 ft.

A4D SKYHAWK

(U) A light attack bomber, the A4D was the smallest jet bomber in the U.S. weapons inventory when it was introduced in the mid-1950s. Designed to operate from carriers and short landing fields, the A4D was used by both the Navy and the Marine Corps. Design emphasized simplicity of structure and equipment. The SKYHAWK was rushed through development in only 18 months from the time design work started. Its maiden flight took place on 22 June 1954. By late 1960 nearly 1,000 A4Ds had been delivered to the Navy. Some were modified for inflight refueling.

A4D SKYHAWK (Contd.)

(U)	Year in service	1954
	Weight	17,295 lb.
	Range	2,000 nm.
	Maximum speed	680 mph
	Bomb load	3,000 lb.

A3J/A-5 VIGILANTE

(U) In September 1956 the Navy authorized construction of a small batch of these all-weather attack bombers. A follow-on production order was issued in January 1959 after successful test flights. Specifications stipulated high-altitude operation and thermonuclear capability over a range of several hundred miles at an over-target speed of better than Mach 2. A unique feature of the VIGILANTE was its linear weapons-bay which ejected bombs from the tail of the aircraft. The range of the A3J could be increased through a "buddy tanker" refueling pack. The first A3J flew on 31 August 1958. Initial carrier trials were completed in July 1960. In 1963 the A3J was superseded by a slightly larger and heavier model, the A-5.

(U)	Year in service	1960
	Weight	60,000 lb.
	Range	2,300 nm.
	Maximum speed	Mach 2+ at 40,000 ft.
	Service ceiling	60,000 ft.

INTERCEPTOR AIRCRAFT

P-51 MUSTANG

(U) The first propeller-driven MUSTANG long-range fighter was designed and built in 1940 to British specifications in only 100 days. Adopted for use by the AAF in World War II, the P-51 underwent constant refinement and improvement, leading to the development of numerous variants. The P-51H, which was designated a day-interceptor, remained in production until November 1945 and was retained in the active inventory after the war, primarily in the role of a fighter-escort.

(U)	Year in service	1942
	Take-off weight	11,000 lb.
	Range (fighter model)	740 nm.
	Maximum speed	434 kn.
	Service ceiling	41,600 ft.
	Armament	Six machine guns

P-82 TWIN MUSTANG

(U) As its name implied, the P-82 was two MUSTANG fuselages joined together by a constant-chord center section and a rectangular tailplane. The P-82 superseded the P-51H when the latter was withdrawn from production in 1945. Though primarily used as a fighter-escort, two P-82 versions -- the F and G -- were produced as fighter interceptors.

		F-82F	F-82G
(U)	Year in service	1948	1948
	Take-off weight	26,000 lb.	26,000 lb.
	Range	1,920 nm.	1,945 nm.
	Maximum speed	400 kn.	400 kn.
	Combat ceiling	36,800 ft.	37,200 ft.
	Armament	Six machine guns	Six machine guns

F-86 SABREJET

(U) Best known for its role in the Korean War, the F-86 swept-wing turbojet was adapted for air defense as well as tactical and ground support missions. The interceptor variants of this aircraft included the F-86D and the F-86L, which carried SAGE data-link equipment.

SABREJET (Contd.)

		F-86D	F-86L
(U)	Year in service	1953	1956
	Take-off weight	20,000 lb.	20,000 lb.
	Range	470 nm.	450 nm.
	Speed	600 kn.	465 kn.
	Ceiling	49,600 ft.	48,250 ft.
	Armament	24 air-to-air rockets	24 air-to-air rockets

F-89 SCORPION

(U) The midwing all-weather F-89 turbojet interceptor underwent its first test flight in 1948. Designed primarily for air defense the F-89 entered operational service in 1952. It was removed from active USAF inventory and reassigned to ANG units in the early 1960s. The F-89 was developed in a variety of configurations. The last to be produced -- the "J" model used by the Air National Guard -- was actually an earlier model factory-modified to incorporate improvements made throughout the series.

		F-89J
(U)	Year in service	1956
	Take-off weight	45,000 lb.
	Range	900 nm.
	Speed	450 kn.
	Ceiling	43,500 ft.
	Armament	Two MB-1 GENIE nuclear rockets

F-94 STARFIRE

(U) The F-94 was a two-place all-weather interceptor variant of the T-33 jet trainer which evolved from the F-80 SHOOTING STAR. Unique structural features of the F-94 were its thin straight midwing and swept-back tail. The F-94C, which was designated for air defense, was the first interceptor armed exclusively with air-to-air rockets.

		F-94C
(U)	Year in service	1953
	Take-off weight	24,200
	Range	1,000 nm.
	Speed	555 kn.
	Ceiling	51,400 ft.
	Armament	48 air-to-air rockets

F-101 VOODOO

(U) The F-101 was a two-place long-range fighter, of which the "B" was an all-weather interceptor used by the Air Defense Command and Tactical Air Command. Development of the VOODOO interceptor began in 1955. The first flight was made in March 1957. The missiles fired by an automatic search and track control system.

		F-101B
(U)	Year in service	1959
	Take-off weight	51,725 lb.
	Combat radius	603 nm.
	Combat speed	950 kn.
	Combat ceiling	51,000 ft.
	Armament	2 MB-1 Rockets; 2 FALCON AAMs

F-102 DELTA DAGGER

(U) The mission of the delta-wing single-place supersonic F-102 was interception and destruction of attacking enemy aircraft under all weather conditions. It was equipped with the MG-10 fire control system which searched out targets and automatically prepared FALCON air-to-air missiles for firing. Most F-102s were used by the ADC until 1969-1970. The few F-102s that remained in the U.S. inventory were assigned to ANG units.

		F-102A
(U)	Year in service	1956
	Take-off wieght	31,275 lb.
	Combat radius	566 nm.
	Combat speed	677 kn.
	Service ceiling	51,400 ft.
	Armament	2 AAMs

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CLASSIFIED

(b)(1) + (b)(3)

TABLE 31

U.S. STRATEGIC BUDGET 1945-72
TOTAL OBLIGATIONAL AUTHORITY*

FY	Current $ (billions)	% of Total Defense Budget	Constant FY 1976 $ (billions)	% of Total Defense Budget
1945	11.2	13.7	45.6	12.5
1946	4.1	11.0	16.3	9.6
1947	1.5	10.5	5.3	9.3
1948	1.5	12.3	5.0	11.2
1949	1.7	12.5	5.3	11.0
1950	2.5	16.2	7.3	14.4
1951	7.7	15.5	22.4	15.3
1952	11.3	18.0	32.6	17.5
1953	8.8	18.7	25.4	18.1
1954	4.9	15.2	14.0	14.4
1955	7.0	19.7	18.9	18.5
1956	9.6	23.5	24.8	22.7
1957	11.2	26.8	27.7	25.1
1958	11.0	25.5	26.6	24.5
1959	11.9	27.2	28.1	26.4
1960	10.3	24.8	24.1	24.0
1961	12.1	26.1	27.7	25.4
1962	10.9	21.7	25.1	21.3
1963	9.8	19.3	22.7	19.3
1964	8.5	16.8	19.1	16.8
1965	6.3	12.4	14.0	12.6
1966	6.1	9.3	13.0	9.3
1967	6.3	8.7	12.8	8.6
1968	7.2	9.5	14.0	9.4
1969	8.5	10.8	15.6	10.7
1970	7.0	9.2	12.0	9.2
1971	7.3	9.9	11.8	9.9
1972	7.3	9.4	11.0	9.6

Source: Comptroller, OSD, Defense Budget and FYDP Breakdown Since FY 1945, 24 July 1975.
*Dollar figures include RDT&E and are therefore larger, as are percentages, than figures for corresponding years in Table 30.

GLOSSARY OF ABBREVIATIONS

AAA	Antiaircraft Artillery
AAF	Army Air Forces
ABM	Antiballistic Missile
AEC	Atomic Energy Commission
AFB	Air Force Base
AMSA	Advanced Manned Strategic Aircraft
ARDC	Air Research and Development Command
ARPA	Advanced Research Projects Agency
ASW	Antisubmarine Warfare
BAS	Bomb Alarm System
BMD	Ballistic Missile Division
BMEWS	Ballistic Missile Early Warning System
BoB	Bureau of the Budget
CEP	Circular Error Probable
CIA	Central Intelligence Agency
CINCEUR	Commander in Chief, Europe
CINCLANT	Commander in Chief, Atlantic Command
COMINT	Communications Intelligence
CNO	Chief of Naval Operations
CONAD	Continental Air Defense Command
DDR&E	Director of Defense Research and Engineering
DEW	Distant Early Warning
DGZ	Designated Ground Zero
DIA	Defense Intelligence Agency
DoD	Department of Defense
DOSAAF	Volunteer Society for Cooperation with the Army Aviation and the Fleet
DPM	Draft Presidential Memorandum
DSP	Defense Support Program
DSTP	Director of Strategic Target Planning
EDC	European Defense Community
ELINT	Electronic Intelligence
EMP	Electromagnetic Pulse
FBS	Forward-based System
FOBS	Fractional Orbital Bombardment System
FY	Fiscal Year
GNP	Gross National Product
GOKO	State Committee for Defense
ICBM	Intercontinental Ballistic Missile
IOC	Initial Operational Capability
IRBM	Intermediate Range Ballistic Missile

JCAE	Joint Committee on Atomic Energy
JCS	Joint Chiefs of Staff
JSTPS	Joint Strategic Target Planning Staff
KGB	Committee of State Security
LOFAR	Low Frequency Analysis and Recording
LCF	Launch Control Facility
LRA	Long-range Air Force
MBFR	Mutual and Balanced Force Reduction
MGB	Ministry of State Security
MIRV	Multiple Independently Targetable Reentry Vehicle
MLF	Multi-lateral Force
MMRBM	Mobile Mid-range Ballistic Missile
MRBM	Medium-range Ballistic Missile
MRV	Multiple Reentry Vehicle
MVD	Ministry of Internal Affairs
NASA	National Air and Space Administration
NIE	National Intelligence Estimate
NKVD	Ministry of Internal Affairs
NORAD	North American Air Defense Command
NSAM	National Security Action Memorandum
NSC	National Security Council
NSTAP	National Strategic Attack Policy
NSTL	National Strategic Target List
OCDM	Office of Civil and Defense Mobilization
OEP	Office of Emergency Preparedness
OSD	Office of the Secretary of Defense
PAL	Permissive Action Link
PBV	Post Boost Vehicle
PK	Probability of Kill
PPB	Planning-Programming-Budgeting
PSAC	President's Science Advisory Committee
PSI	Pounds Per Square Inch
PVO STRANY	Soviet Air Defense Forces
R&D	Research and Development
RET	Retired
RSFSR	Russian Soviet Federal Socialist Republic
RV	Reentry Vehicle
SAC	Strategic Air Command
SACEUR	Supreme Allied Commander, Europe
SAGE	Semi-automatic Ground Environment
SALT	Strategic Arms Limitation Talks
SCAM	Strategic Cost Analysis Model
SEATO	Southeast Asia Treaty Organization

SIOP	Single Integrated Operations Plan
SLBM	Sea Launched Ballistic Missile
SRF	Strategic Rocket Forces
SSBN	Fleet Ballistic Missile Submarine
TAC	Tactical Air Command
TOA	Total Obligational Authority
UMT	Universal Military Training
U.N.	United Nations
U.S.	United States
USAF	United States Air Force
U.S.S.R.	Union of Soviet Socialist Republics
WDD	Western Development Division
WSEG	Weapons Systems Evaluation Group
WWCC	World-wide Coordination Conference

CHAPTER I

NOTES

1. (U) David Lilienthal, The Journals of David Lilienthal, Vol 2: The Atomic Energy Years, 1945-1950 (New York, 1964), pp 165-66; (U) Richard G. Hewlitt and Francis Duncan, A History of the U.S. Atomic Energy Commission (hereafter referred to as AEC History), Vol II: Atomic Shield, 1947-1952 (University Park, Pa., 1969), p 47.

2. Alexis de Tocqueville, Democracy in America (New York, 1976), Vol I, 434.

3. (U) New York Times, 24 Jun 41.

4. The memorandum is printed in (U) Arthur Krock, Memoirs: Sixty Years on the Firing Line (New York, 1968), pp 419-82, quotation on p 478; see (TS/RD) Samuel Williamson and Steven Rearden, "The View from Above: High-Level Decisions and the Soviet-American Strategic Arms Competition, 1945-1950," pp 48-49 (OSD Historian files); and (U) Robert J. Donovan, Conflict and Crisis (New York, 1977), pp 221-22.

5. (U) Williamson and Rearden, "High-Level Decisions," pp 50-51; (U) U.S. State Dept, Foreign Relations of the United States, 1946 (hereafter referred to as FRUS), Vol VII, 840.

6. See (U) Ernest R. May, The Truman Administration and China, 1945-1949 (Philadelphia, 1975).

7. Patterson is quoted in (U) Edward A. Kolodziej, The Uncommon Defense and Congress, 1945-1963 (Columbus, Ohio, 1966), p 49. See (U) Perry McCoy Smith, The Air Force Plans for Peace, 1943-1945 (Baltimore, 1970); (U) Vincent Davis, Postwar Defense and the U.S. Navy, 1943-1946 (Chapel Hill, N.C., 1966); (U) Michael S. Sherry, Preparing for the Next War; American Plans for Postwar Defense, 1941-1945 (New Haven, Conn., 1944); (U) William M. Wix, "The Army's Plans for its Post-war Role, 1943-1945" (MS Ph.D. dissertation, Columbia Univ, 1976).

8. See summary of Service presentation to Congress in 1945-48 in (U) Kolodziej, The Uncommon Defense, pp 38-74.

9. See (TS/RD) Williamson and Reardon, "High-Level Decisions," pp 205-206, 211-13; (U) Bernard Baruch, The Public Years (New York, 1960), pp 372-82.

10. (TS) Leonard Wainstein et al, The Evolution of U.S. Strategic Command and Control and Warning, 1945-1972, (referred to hereafter as Wainstein et al, Study S-467) IDA Study S-467 (June 1975), pp 16-17.

11. (C) Ibid, p 11.

12. Quoted in (U) Frederick M. Sallagar et al, "History of the Strategic Arms Competition: Forces and Budgets Study (Blue Side)," RAND Study WN-9000-ARPA (April 1975) (hereafter referred to as Sallagar et al, "Blue Side"), Pt 1, p 12.

13. (S) Acting SecNavy to President, 24 Jul 46, RG 330, CD 21-1-3; (S) memo, SecNavy to SecDef, 8 Dec 47, RG 330, CD 11-1-5.

14. Except where otherwise noted, this section draws on (U) Sallagar et al, "Blue Side," (U) Frederick M. Sallagar, "Ready Forces vs Mobilization Potential" (RAND Study dated 20 May 77); (U) Kolodziej, The Uncommon Defense, pp 33-70; and (U) Samuel P. Huntington, The Common Defense (New York, 1961), pp 25-47.

15. Arnold Wolfers in (U) Bernard Brodie (ed), The Absolute Weapon (New York, 1946), p 88.

16. (TS) Memo, SecDef to President, Jan 48, RG 330, CD 6-2-2. (Forrestal wrote erroneously that the runway required 40 feet of subsurface construction.)

17. Quoted in (U) Kolodziej, The Uncommon Defense, p 78.

18. U.S. Strategic Bombing Survey, Over-all Report (European War) (Washington, D.C., 1945), pp 107-108.

19. (TS/RD) U.S. Dept Air Force, Lee Bowen and Robert D. Little, "A History of the Air Force Atomic Energy Program, 1943-1953," Vol II, Pt 1, 211. (The title of Volume II differs slightly from the other volumes, but this title is used here for all. Referred to hereafter as "AF Atomic Energy Program.")

CHAPTER II

NOTES

1. Much of the material in this section draws upon (TS/RD) Williamson and Rearden, "High-Level Decisions"; (TS) Wainstein et al, Study S-647; and (S) Sallagar et al, "(Blue Side)," Pt 1, all cited in full in Chapter I.

2. (U) James Forrestal, diaries, entry for 10 Oct 48; details on the actual forces appear in (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol II, Pt 1, 234.

3. (U) Arthur H. Vandenberg, Jr., The Private Papers of Senator Vandenberg (Boston, 1952), pp 479-83.

4. (U) Huntington, The Common Defense, p 236.

5. LtGen Alfred M. Gruenther, Dep C/S, P&O, USA, to DepSecDef, 31 Jan 50, RG 330, CD 22-2-2.

6. (TS) G-2, USA, to C/S, USA, 14 Mar 48, OSD 21, CD 18-1-24; (TS) Jt Intell Committee, JIC 435, 23 Aug 48; (U) USN General Bd, G.B. 425, "National Security and Navy Contributions thereto," Serial 315, 25 Jun 48, in (U) Navy Supporting Study, Lulejian and Associates, "U.S. Aircraft Carriers in the Strategic Role," Pt 1, Oct 75, I-50 (hereafter referred to as Lulejian, "Carriers.")

7. (S) Edmund Brunner, Jr., "U.S. and Soviet Military Forces and Budgets, 1945-1972," Rand WN (L)-9635-ARPA, Oct 76; (S) Air Force Supporting Study, USAF, "A History of Strategic Arms Competition, 1945-1972" (hereafter referred to as USAF, "Competition"), Vol IV, tables 6A-G.

8. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol V, 3-5; (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 90-91.

9. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol II, Pt 1, 260-61; prior Air Force planning is summarized in (TS/RD), ibid, pp 255-60; Navy and Army planning are summarized in Lulejian, "Carriers," Pt 1, 32-54.

10. Estimates of numbers of trained crews varied from 11 to 48. See (S) Wainstein et al, Study S-647, pp 72-73.

11. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol II, Pt 1, 233-34.

12. (S) Wainstein et al, Study S-647, pp 17-18, 46-47.

13. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol II, Pt 1, 261, 264.

14. (TS/RD) Ibid, pp 261-62.

15. (TS/RD) JCS 1745/15, 2 Sep 48; (TS/RD) JCS 1745/18, 2 Dec 48; both summarized ibid, p 262.

16. (TS) Wainstein et al, Study S-647, pp 11-12; (S) interview with Gen Curtis Lemay, 15 Aug 75, by A. Goldberg and E. May; R.F. Futrell, Ideas, Concepts, and Doctrine: A History of Basic Thinking in the United States Air Force, (Air Univ, June 1971), Vol I, passim.

17. (TS/RD) SAC Emergency War Plan 1-49, 14 May 49, summarized in (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol III, Pt 2, 329-30.

18. (TS/RD) Ibid, Vol II, Pt 1, 265-71.

19. (TS) Dir, P&O, USAF, to C/S, AF, 24 Nov 48, RG 341, PD 110.01 (27 Aug 47).

20. (U) USN General Bd, G.B. No. 425, Serial 315, 25 Jun 48, in (U) Lulejian, "Carriers," Pt 1, 45-54.

21. (U) Ibid, pp 30-32, 119-21.

22. (U) Ibid, pp 72-74, 127-28, 154-60.

23. (U) Richard G. Hewlett and Francis Duncan, Nuclear Navy, 1946-1962 (Chicago, 1974), pp 41-58; (U) D.S. Fahrney, "The History of Pilotless Aircraft and Guided Missiles," Chap XV passim (MS in Office of Naval History).

24. (TS) Adm Robert B. Carney to SecDef, 29 Sep 48, RG 330, CD 2-2-5, contains a detailed commentary on Army estimates and plans; (TS) LtGen Albert C. Wedemeyer, Dir, P&O, USA, to SecArmy, 26 Nov 47, RG 330, CD 6-1-28, describes the original joint plan for operations in the Mediterranean; the Army's retreat from support of such operations as part of a general war plan is detailed in (U) Lulejian, "Carriers," Pt 1, 120-21. (Army positions on these matters are inferred from documents in OSD and Navy files.)

25. (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 92-96; Kolodziej, The Uncommon Defense, pp 74-81.

26. (S) SecAF to SecDef, 8 Jun 48, RG 330, CD 9-2-4; (U) SecAF to SecDef, 22 Oct 48, RG 330, CD 3-2-59; (TS) SecAF to SecNavy, 21 Jul 48, RG 330, CD 16-1-8; (C) SecArmy to SecDef, 28 Sep 48, RG 330, CD 5-1-43.

27. (TS) C/S, USA, to SecDef, 11 Dec 47, RG 330, CD 3-1-29; (U) Paul Y. Hammond, "Super Carriers and B-36 Bombers," in Harold Stein (ed), American Civil-Military Decisions (Tuscaloosa, Ala., 1963), pp 468-83.

28. (TS) SecNavy to SecAF, 9 Aug 48, RG 330, CD 16-1-8; (TS) SecAF to SecDef, 6 Oct 48, ibid.

29. (U) JCS Ad Hoc Committee, Report (Harmon Report) to the JCS, "Evaluation of Effect on Soviet War Effort Resulting from the Strategic Air Offensive," 11 May 49, A1/EM3/7, JCS, Sec III, Op 23 files, summarized in (U) Lulejian, "Carriers," Pt 1, 134-37; (TS) Wainstein et al, Study S-647, pp 19-20; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol III, Pt 2, 344-48.

30. (U) Lulejian "Carriers," Pt 1, 120-22.

31. (U) Ibid, pp 83-87.

32. (U) Ibid, p 87.

33. (TS) Jt Strategic Planning Committee 851/3, 15 Jun 48.

34. (S) Wilfred J. McNeil to SecDef, 1 May 48, OSD 42; (TS) SecDef to President, 1 Feb 48, RG 330, CD 25-1-11; (S) Dir, BoB, to President, 28 Mar 49, RG 51, Series 47.3a; (U) BGen R.B. Landry, USAF, to President, 16 Apr 49, President's Secretary's File, General File, Box 12c, (Landry), Truman Papers, Truman Library; (U) BGen R.B. Landry, USAF, to President, 19 Apr 49, ibid.

35. (TS) President to SecDef, 21 Apr 49, RG 330, CD 23-1-19; (TS) SecDef to JCS, 27 Apr 49, ibid; (TS) SecDef to President, 27 Apr 49, ibid; (TS) CNO to SecDef, 5 May 49, ibid; (TS) CNO to SecDef, 28 Jul 49, ibid; (U) President to SecDef, 17 Nov 49, President's Secretary's File, NSC File, Box 1 (Atomic Bomb - Strategic Bombing), Truman Papers, Truman Library; (TS) Ch,JCS to DepSecDef, 18 Nov 49, RG 330, CD 23-1-19); (TS) SecDef to President, 21 Nov 49, ibid; (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 156-57.

36. (U) Kolodziej, The Uncommon Defense, p 101.

37. (TS/RD) Williamson and Rearden, "High-Level Decisions" pp 161-62.

38. (U) Lulejian, "Carriers," Pt 1, 115-17, 122-24.

39. See (U) Hammond, "Super Carriers," pp 465-569; (U) Warner Schilling, "FY 1950," in Schilling et al, Strategy, Politics and Defense Budgets (New York, 1962) pp 1-266; and (U) Kolodziej, The Uncommon Defense, pp 89-123.

40. (U) U.S. Cong, House, Committee on Armed Services, National Defense Program--Unification and Strategy, Hearings (1949), 81st Cong, 1st sess, quoted in (U) Kolodziej, The Uncommon Defense, p 110.

41. (U) Ibid, p 111.

42. (U) "Unification and Strategy" hearings quoted in Huntington, The Common Defense, p 384.

43. (C) Interview with Ray S. Cline, 8 Jul 75, by A. Goldberg et al; interview with Spurgeon Keeny, 22 Jul 75, by A. Goldberg et al.

44. (U) Hewlett and Duncan, AEC History, Vol II, 320-21.

45. (U) Ibid, pp 72-76.

46. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 17-18.

47. (TS/RD) Ibid, p 18; (U) Hewlett and Duncan, AEC History, Vol II, 178-79.

48. (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 166-68, 189-96; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 19-20.

49. (TS/RD) Ibid, pp 20-24, 32-33, 52-71.

50. (U) Hewlett and Duncan, AEC History, Vol II, 473.

51. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 53-61.

52. (TS/RD) Ibid, pp 65-75, 103-116.

53. (TS/RD) Ibid, pp 117-23.

54. (TS/RD) Ibid, pp 158-60.

55. (TS/RD) Ibid, Vol III, Pt 2, 257-60.

56. This section is drawn primarily from (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 192-230, and the sources cited therein.

57. The report of the committee appears as an appendix in (U) Herbert York, The Advisors: Oppenheimer, Teller, and the Hydrogen Bomb (New York, 1976).

58. (U) Lewis Strauss to the President, 25 Nov 49, in Lewis Strauss, Men and Decisions (Garden City, N.Y., 1962), pp 219-22.

59. (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 208-209; (TS/RD) Ch, JCS, to SecDef, 23 Nov 49, OSD 20, CD 16-1-17.

60. (U) Memo by Paul Nitze, Dir, PPS, State, 17 Jan 50, FRUS, 1950, Vol I, 13-17.

61. (TS/RD) Williamson and Rearden, "High-Level Decisions," p 222.

62. (U) Lilienthal, Journals, Vol 1, 632.

63. (S) Hearings before Jt Committee on Atomic Energy (JCAE), 27 Jan 50, Box 5301, Folder 37, ERDA Records.

64. Ibid.

65. Except where otherwise noted, this section relies on (TS/RD) Williamson and Rearden, "High-Level Decisions," pp 204-217, and (TS) Samuel F. Wells, Jr., "Sounding the Tocsin: NSC-68" (draft MS prepared for the OSD Historian), and (U) Paul Y. Hammond, "NSC-68," in (U) Schilling et al, Strategy, pp 273-378.

66. (TS) NSC 52/3, 21 Sep 49, RG 330, CD 5-1-50.

67. (TS) Office of Reports and Estimates, CIA, ORE 91-49, 10 Feb 50, RG 330, CD 11-1-2.

68. (TS) CIA, ORE 91-49, 6 Apr 50 with footnotes by the intelligence agencies, CIA files.

69. (TS) Jt Intell Grp, JIG 312, "Soviet Intentions and Capabilities 1954," 6 Apr 50; (TS) Jt Intell Grp, JIG 312/1, "Soviet Intentions and Capabilities-mid 1951," 7 Apr 50; (TS) Jt Intell Grp, JIG 520/3, "Soviet Intentions and Capabilities 1954," 7 Jun 50, JCS files.

70. (TS) Memo, MajGen James H. Burns for SecDef, 23 Feb 50, RG 330, CD 16-1-17.

71. (TS) Memo, Najeeb Halaby, Dir, Office of Foreign Military Affairs, for SecDef, 24 Feb 50, RG 330, CD 6-1-45.

72. (TS) Memo, MajGen Burns for SecDef, 13 Mar 50, RG 330, CD 16-1-17.

73. (U) Memos of meeting of Policy Review Grp with outside consultants, 27 Feb - 20 Mar 50, FRUS, 1950, Vol I, 168-182, 190-201.

74. (U) Hewlett and Duncan, AEC History, Vol II, 415-16.

75. (U) NSC-68, "A Report to the National Security Council on United States Objectives and Programs for National Security," 7 Apr 50, version in President's Secretary's File, Truman Papers, Truman Library. It also appears, with minor differences, in (U) FRUS, 1950, Vol I, 234-92.

76. (TS/RD) Hearings before JCAE, 30 Jan 50, RG 330, CD 471.6 (A-Bomb).

77. (U) Interview with Paul Nitze, 18 Jul 75, by A. Goldberg et al.

78. (U) Memo by Edward Barrett, ASec/State(PA), 6 Apr 50, FRUS, 1950, Vol I, 225-26; (U) memo by Llewellyn Thompson, DepASec/State for European Affairs, 3 Apr 50, ibid, pp 213-14; (S) Charles E. Bohlen, Min in Paris, before the Voorhees Group, 3 Apr 50, RG 330, CD 16-1-20; (U) memo by Bohlen, 5 Apr 50, FRUS, 1950, Vol I, 221-25.

79. (TS) SecNavy to SecDef, 6 Apr 50, RG 330, CD 16-1-17; (TS) SecArmy to SecDef, 7 Apr 50, ibid; Vannevar Bush to Ch, JCS, 13 Apr 50, FRUS, 1950, Vol I, 227-34; (TS) SecAF to SecDef, 6 Apr 50, RG 330, CD 16-1-17.

80. (TS) SecDef to President, 11 Apr 50, ibid.

81. (U) Bureau of the Budget, "Budget Projections," 25 Nov 49, RG 51, Series 39.27a, Box 2; (U) President to ExSec, NSC, 12 Apr 50, FRUS, 1950, Vol I, 234-35. Previously, the Under Secretary of State had evinced awareness of the President's probable sensitivity on this score. When distributing the draft to senior officials of the Department, he had called for "extraordinary security precautions" and added: "If the President decides in the negative, no one in this Department will refer to that fact or talk about this study." (U) Memo by USec/State, 30 Mar 50, ibid, pp 210-11.

82. (U) Memo by National Security Resources Bd (NSRB), 29 May 50, ibid, pp 316-21; (U) memcon of Meeting of USec/State's Advisory Committee, 6 Jun 50, ibid, pp 323-24; (TS) Frank Whitehouse, OSD, to MajGen James H. Burns, 22 May 50; (TS) memo by SecDef, 25 May 50, RG 330, CD 16-1-17.

CHAPTER III

NOTES

1. Except where otherwise noted, numbers for Soviet military manpower, divisions, naval forces, air forces, and budgets are taken from (S) Abraham S. Becker and Edmund D. Brunner, "The Evolution of Soviet Military Forces and Budgets, 1945-1953," Rand WN(L)-9248-ARPA, Sep 75 (hereafter referred to as Becker and Brunner, "Evolution.") The 1948 estimate is from (S) CIA, Strategic Intelligence Digest, USSR, Vol III, Mar 48.

2. (U) Harry Rositzke, C.I.A. Secret Operations (New York, 1976), pp 15-16.

3. (U) Robert W. Herrick, Soviet Naval Strategy: Fifty Years of Theory and Practice (Annapolis, Md., 1968), p 88.

4. (U) Raymond L. Garthoff, Soviet Military Doctrine (Glencoe, Ill., 1953), p 302.

5. Except where otherwise noted, assertions about the organization of the Soviet government and personnel in particular posts draw upon (S) Jeremy R. Azrael, "An Outline History of Soviet Strategic Perceptions, Policies, and Programs, 1945-1953," Pt 1, Attachment to Rand L-36, Apr 75. Assertions having to do with relationships between the design bureaus and higher authorities in the Soviet Union draw additionally on (TS-Codeword) Karl L. Spielman, Jr., "The Evolution of Soviet Strategic Command and Control and Warning," IDA, May 75.

6. (U) U.S. Cong, Jt Economic Committee, Comparison of the United States and Soviet Economies, 86th Cong, 1st sess, pp 143-76, 355-69.

7. (U) John Erickson, The Soviet High Command, 1918-1941. (New York, 1962) remains the best study of prewar developments.

8. (U) New York Times, 22 Jul 45.

9. Except where otherwise noted, assertions concerning Soviet fighter, interceptor, surface-to-air missile, and civil defense programs are based on (TS/RD) BDM Final Technical Report, "History of Strategic Air and Ballistic Missile Defense, 1945-1972," Bk I, II-19; and (TS/RD) BDM, Bk II, V-36, V-54-60, V-96-101, V-115-17, V-131-32.

10. (TS/RD) BDM, Bk II, V-15-26, for which the principal sources are (U) Alexander S. Yakovlev, Fifty Years of Soviet Aircraft Construction (Moscow, 1966: FTD translation), p 102; and (U) Alexander S. Yakovlev, Target of Life (Moscow, 1966: FTD translation), pp 352-53, 363-67.

11. (U) Khrushchev Remembers, Strobe Talbott, trans. and ed (Boston, 1974), Vol I, 39. The full title of the of the second volume is Khrushchev Remembers: The Last Testament, but it will be cited as Khrushchev Remembers, Vol II.

12. (S) USAF, "Competition," Jun 76, Vol I, 432-33; (TS) FMSAC-STIR/TCS/73-11, TCS 35253/73, "Major Soviet Missile Design Entities," Jun 73; (U) Leonid Vladimirov, The Russian Space Bluff (New York, 1973), pp 42-43; (U) Robert M. Slusser, ed, Soviet Economic Policy in Postwar Germany: A Collection of Papers by Former Soviet Officials (New York, 1953), pp 19-22, 34-35; (U) Gregory Tokaev, Comrade X (London, 1956), p 313.

13. This paragraph draws largely on (U) Arnold Kramish, Atomic Energy in the Soviet Union (Stanford, 1959), pp 1-120, supplemented by (TS) USAF, "Competition," Vol I, 365-70; (TS/CD) NIE 11-3-54, "The Soviet Atomic Energy Program to Mid-1957," 16 Feb 54; and (TS/CD) NIE 11-2-69, "Soviet Nuclear Programs," 3 Jul 69.

14. (U) J.M. Mackintosh, Juggernaut: A History of the Soviet Armed Forces (New York, 1967), pp 271-72.

15. (U) Michael MccGwire, "Soviet Naval Procurement," in R.U.S.I., The Soviet Union in Europe and the Near East (London, 1970), pp 76-80, 74-87; (TS/CD) NIE 11-15-74, "Soviet Naval Policy," 12 Jul 74; Becker and Brunner, "Evolution," pp 15, 31.

16. (U) Gregory Tokaev, Stalin Means War (London, 1970), p 126; (U) Boris I. Nicolavesky, Power and the Soviet Elite (New York, 1965), p 239; Khrushchev Remembers, Vol II, 253-56.

CHAPTER IV

NOTES

1. (S/CNWDI) U.S. Atomic Energy Commission, Div of Military Application, A History of the Nuclear Weapons Stockpile, FY 1945-FY 1972, (hereafter referred to as USAEC, Stockpile), 22 Feb 73, tables 1 and 3; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol III, Pt 1, 115-18.

2. (U) NSC-73, 1 Jul 50; FRUS, 1950, Vol I, 331-38; (TS) Prime Minister to President, 6 Jul 50, RG 330, CD 091.7 (Europe).

3. (TS) NSC Action No. 321, 27 Jul 50, FRUS, 1950, Vol I, 351-52.

4. (TS) Unsigned memorandum, 22 Jul 50, Fiscal 1951 Supplemental Folder; (U) 24 Jul 50, ibid; (U) Kolodziej, The Uncommon Defense, pp 132-33.

5. (S) Unsigned memorandum, 17 Sep 50, Fiscal 1951 Supplemental Folder; (U) JCS to SecDef, 19 Nov 50, FRUS, 1950, Vol I, 416-18; (U) Kolodziej, The Uncommon Defense, pp 132-33; Dir, BoB, to President, 1 Dec 50.

6. (U) Kolodziej, The Uncommon Defense, pp 130, 133.

7. (TS) Memo on AFPC Meeting, 14 Nov 50, RG 330, CD 334 (AFPC); (S) DepSecDef to JCS, 17 Nov 50, RG 330, CD 111 (1951); (U) Kolodziej, The Uncommon Defense, pp 133-34.

8. (U) Kolodziej, The Uncommon Defense, pp 140-41; (TS) Ch, JCS, to SecDef, 19 Nov 50, FRUS, 1950, Vol I, 416-18.

9. (U) Kolodziej, The Uncommon Defense, pp 144-52.

10. (U) USAF, "Competition," Vol IV, table II-2.

11. (TS) OSD, Projections of U.S. Military Budgets and Expenditures, FY 51-54, 21 Jul 51, 1952 Budget Tables.

12. (S) SecDef to Service Secs, 29 Oct 51, RG 330, CD 381 (War Plans, NSC-114); (C) Dir, BoB, to SecDef, 29 Dec 51, RG 330, CD 111 (1953); (TS) Ch, JCS, to SecDef, 4 Jan 52, ibid; (TS) McNeil to SecDef, 8 Jan 52, ibid; (TS) SecDef to President, 4 Jan 52, ibid; (U) Kolodziej, The Uncommon Defense, p 153.

13. (TS) JIG 312, 6 Apr 50; (TS) JIC 530/1, 19 Aug 50; (U) NSC-68, 7 Apr 50, FRUS, 1950, Vol I, 287.

14. (TS) NSC-68/1, 21 Sep 50; (U) Mins of NSC Meeting, 14 Dec 50, FRUS, 1950, Vol I, 466-67; (TS) NSC-114/2, 12 Oct 51; (U) Kolodziej, The Uncommon Defense, p 157.

15. (U) Kolodziej, The Uncommon Defense, pp 156-66.

16. (U) NSC-68, FRUS, 1950, Vol I, 235-92. (The quotation is from p 283.)

17. (U) Ibid, pp 249, 287, 291.

18. (U) Memo of NSC Consultants' Meeting, 29 Jun 50, ibid, pp 327-30; memo by Bohlen, 13 Jul 50, ibid, pp 342-44; (U) memcon, SecState and President, 14 Jul 50, ibid, pp 344-46.

19. (U) Memo, Service Secs for SecDef, 1 Aug 50, FRUS, 1950, Vol I, 353-57; (TS) Ch, JCS, to SecDef, 3 Aug 50, RG 330, CD 092 (Korea); (TS) Ch, JCS, to SecDef, 1 Aug 50, CD 471.6 (A-Bomb); (U) Ch, JCS, to SecDef, 19 Nov 50, FRUS, 1950, Vol I, 416-18.

20. (U) NSC-73/4, 25 Aug 50, FRUS, 1950, Vol I, 376-89 (the quotation is from p 385); U.S. Cong, House, Subcommittee of Committee on Appropriations, Second Supplemental Appropriation Bill FY 1951, Pt 1, 81st Cong, 2d sess, p 21; U.S. Cong, Senate, Committee on Appropriations, Hearings, Department of Defense Appropriations, FY 1952, 82d Cong, 1st sess, pp 2-5; U.S. Cong, House, Committee on Appropriations, Department of Defense Appropriations, FY 1952, Hearings, 82d Cong, 1st sess, pp 203ff, for testimony of Ch, JCS.

21. (TS) NSC 114/1, 8 Aug 51, FRUS, 1951, Vol I, 129-32; (TS) NSC 114/2, 12 Oct 51, ibid, 182ff.

22. (TS) CIA, Memo SE-13, 24 Sep 51, ibid, 196-99.

23. (TS) NSC 135/3, 25 Sep 52, to be published in FRUS, 1952, Vol I.

24. See below, pp 250-52.

25. (U) I.F. Stone, The Hidden History of the Korean War (New York, 1952), pp 104-106.

26. (U) Memcon, SecState with President, 14 Jul 50, FRUS, 1950, Vol I, 345.

27. (U) Hewlett and Duncan, AEC History, Vol II, 551-54, 497-98; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 33-39; (TS) JCS to SecDef, 10 Nov 52, RG 330, CD 471.6 (A-Bomb).

28. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 51-68, 103-105.

29. (TS/RD) Ibid, pp 70-79, 116-20.

30. (TS/RD) Ibid, pp 40-41, 291.

31. (S/CNWDI) USAEC, Stockpile, 22 Feb 73, table 1 (summary data for 1945-54 misplaced in this table; figures for 1946 are actually for 1945; those for 1947 are for 1946, etc.); (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 1, 125-33.

32. (U) Hewlett and Duncan, Nuclear Navy, pp 154-78.

33. (U) Hewlett and Duncan, AEC History, Vol II, 71-74, 489-91; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol V, Pt 2, Chaps 2 and 3.

34. Convenient summaries appear in (U) Eugene M. Emme (ed), The History of Rocket Technology (Detroit, 1964); (S) BDM, 3k II, pp IV-48-53, describes early Army programs; (U) Fahrney, Pilotless Aircraft, gives details on the internal battle in the Navy; (U) USAF, "Competition," Vol I, 245-66, 279-83, includes material on early Air Force efforts. A more detailed account is (C) Max Rosenberg, "The Air Force and the National Guided Missile Program, 1944-1950 " (Office of Air Force History, Jun 64). LeMay's statement is quoted there on p 36.

35. (TS/RD) JCS, Historical Division, Chronology of Actions of the Joint Chiefs of Staff concerning the Development of Long-Range Guided Missiles Weapons Systems (21 Dec 59) (hereafter referred to as JCS Chron), entries for 14 Sep 49 and 18 Jan 50.

36. (TS/RD) Ibid, entries for 24 Oct 50, 18 Dec 50, and 26 Jun 53.

37. (U) Emme, Rocket Tech, pp 107-110; (S) BDM, Bk II, pp IV-54-60; (S/RD) Army Pamphlet 70-10, Chronological History of Army Activity in the Missile/Satellite Field, (1943-1958) (Sep 58), pp 23-34.

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41. (TS/RD) JCS Chron, entry for 18 Jan 50.

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45. (TS) JCS to SecDef, 18 Jul 50, RG 330, CD 111 (1951).

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47. (TS/RD) Ibid, pp 320-21.

48. (C) SecDef to Service Secs and JCS, 22 Feb 50, FY 52 Budget Considerations.

49. (TS) President to SecDef, 26 Aug 50, RG 330, CD 091.7 (Europe); (TS) Ch, JCS, to SecDef, 30 Aug, 8 Sep 50, ibid.

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51. (TS) Ch, JCS, to SecDef, 3 Aug 50, RG 330, CD 092 (Korea; (U) NSC 73/4 25 Aug 50, FRUS, 1950, Vol I, 375-89 (quotations in pp 376 and 387).

52. (U) Memo, Dept Army to Dept State, 27 Jun 49, enc (23 Jun 49), FRUS, 1949, Vol VII, 1056-57; (TS) NSC Action No. 348, ISA files. (This differs from Action No. 348 as described in (U) FRUS, 1950, Vol I, 375, n 1.)

53. (TS) JCS to SecDef, 19 Nov 50, FRUS, 1950, Vol I, 416-18.

54. (U) Ch, JCS, to SecDef, 6 Dec 50, ibid, 475-77.

55. (TS) OSD Summary Comparison of Forces, 21 Jan 52, in 1952 Budget Tables Folder.

56. (TS) SecDef to JCS, 18 Aug 51, RG 330, CD 381 (War Plans, NSC 68); Lulejian, "Addenda to Chronology . . . .: United States," pp 10-11.

57. (TS) SecAF to SecDef, 16 Jul 51, RG 330, CD 381 (War Plans NSC 68); (TS) SecDef to President, 29 Aug 51, ibid; (TS) SecDef to JCS, 15 Sep 51, ibid.

58. (TS) JCS to SecDef, 11 Oct 51, ibid.

59. (S) SecDef to Service Secs, 29 Oct 51, ibid; (TS) Ch, JCS, to SecDef, 4 Jan 52, RG 330, CD 111 (1953); (TS) McNeil to SecDef, 8 Jan 52, ibid; (U) Max Lehrer to Lyle Garlock, 24 Jul 52, Budget, ibid.

60. (TS) Summary Comparison of Forces, 21 Jan 52, in 1952 Budget Tables Folder; (TS) DeptDef Report to NSC on Status of United States Military Programs as of 30 June 1952, RG 330, CD 381 (War Plans, NSC 114); Hdqtrs,USAF, USAF Statistical Digest, FY 52, p 85.

61. (TS) JCS to SecDef, 11 Mar 52, RG 330, CD 381 (War Plans, NSC 68); (TS) SecDef to Service Secs, 21 Mar 52, ibid; (TS) JCS to SecDef, 23 Apr 52, RG 330, CD 380 (General): (TS) JCS to SecDef, 16 Jan 52, ibid.

62. (TS) NSC 141, 19 Jan 53, p 14.

63. (S) OSD, Dir for Stat Services, Summary of Major Military Forces, Table 10.1, 8 Apr 69; USAF Statistical Digest, FY 53, p 122; Appendix 7, Table 18, 20.

64. (TS) Memo, McNeil to SecDef, 6 Jul 50; (U) NSC 73/4, 25 Aug 50; (U) FRUS, 1950, Vol I, 376-89.

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68. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol III, Pt 2, 320-21.

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70. (TS/RD) Ibid, pt 1, 140.

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73. (TS/RD) "OSD Chron," Vol I, 12 Jan 51; (U) USAF, "Competition," Vol II, pp 682-87.

74. (S) Brunner, "Forces and Budgets," table 2.

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77. (TS/RD) Ibid, Vol III, Pt 2, 327-29.

78. (U) Lulejian, "Carriers," Pt 1, 168-69, 178-79.

79. (U) Ibid, pp 154-62, 165-66.

80. (U) Ibid, pp 176-77; (U) Lulejian, "Addenda to Chronology," p 11.

81. (U) Lulejian, "Carriers," Pt 1, 174-75; (S) ibid, Pt 2, 31-33; (C) interview with Joseph Loftus, 14 Aug 75, A. Goldberg et al; (TS/RD) Bowen and Little, "AF Atomic Energy Programs," Vol III, Pt 2, 328-29.

82. (TS) DeptDef Report to NSC on Status of U.S. Military Programs as of 30 Jun 52, RG 330, CD 381 (War Plans, NSC 114); (TS) NSC 141, 19 Jan 53, p 39.

83. (TS) Ch, JCS, to SecDef, 1 Aug 50, RG 330, CD 471.6 (A. Bomb); (TS) JCS to SecDef, 10 Nov 52, RG 330, CD 381 (War Plans, NSC 135); (TS) JCS to SecDef, 12 Jan 53, ibid.

84. See, e.g., (TS) JIC 641/4, 27 Oct 53.

85. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol IV, Pt 2, 428.

86. (TS) Ch, JCS, to SecDef, 7 Nov 52, RG 330, CD 471.6 (A. Bomb); see (TS) Wainstein et al, Study S-467, pp 27-33.

CHAPTER V

NOTES

1. (U) Memo from Dir, BoB, for SecDef, 3 Feb 53; (S) Memo, DepSecDef to Service Secs, ASecDef(Comp), and JCS, 9 Mar 53, Effects of Budget Costs.

2. (S) SecArmy to DepSecDef, 13 Mar 53; (S) SecNav to SecDef, 13 Mar 53; (S) SecAF to ASecDef(Comp), 17 Mar 53; (TS) JCS to SecDef, 19 Mar 53, NSC 149; (TS) memo, DepSecDef for Service Secs, 10 Apr 53, NSC 149.

3. (U) U.S. Cong, House, Committee on Appropriations, Hearings, Department of Defense and Related Independent Agencies Appropriation for 1954, 83d Cong, 1st sess, pp 309ff, for statement by SecDef Charles E. Wilson.

4. (U) Kolodziej, The Uncommon Defense, pp 166-76.

5. (TS) Gleason Mins, 144th NSC Meeting, 13 May 53; (TS) NSC Actions, notes for 13 May 53, ISA files.

6. (TS) Gleason Mins, 160th NSC Meeting, 27 Aug 53.

7. (TS) Gleason Mins, 161st NSC Meeting, 9 Sep 53.

8. (U) NSC 162/2, 30 Oct 53.

9. (TS) Gleason Mins, 166th NSC Meeting, 13 Oct 53; (TS) Gleason Mins, 168th NSC Meeting, 29 Oct 53.

10. (S) SecDef to Service Secs, 11 Dec 53, together with various memoranda of earlier date, FY 1955 (McNeil File).

11. (U) Kolodziej, The Uncommon Defense, pp 89-214.

12. (TS) Gleason Mins, 179th NSC Meeting, 8 Jan 54; (TS) Gleason Mins, 180th NSC Meeting, 14 Jan 54; (TS) Gleason Mins, 183d NSC Meeting, 4 Feb 54; (TS) Gleason Mins, 189th NSC Meeting, 18 Mar 54; (TS) Gleason Mins, 191st NSC Meeting, 1 Apr 54; (TS) Gleason Mins, 192d NSC Meeting, 6 Apr 54. Generally accurate description of the debates and outcome appears in Melvin Gurtov, The First Vietnam Crisis (New York, 1967), pp 53-130.

13. (U) Dwight D. Eisenhower, Mandate for Change, 1953-1956 (New York, 1963), pp 459-66.

14. (U) Gen Matthew B. Ridgway, Soldier (New York, 1956), pp 274-80.

15. (TS) Gleason Mins, 227th NSC Meeting, 3 Dec 54.

16. (U) Kolodziej, The Uncommon Defense, pp 204-210.

17. (TS) Memo by BGen Charles H. Bonesteel, III, 20 Oct 54, NSC-BNSP-FY56; (TS) memo, McNeil to Bonesteel, 15 Nov 54.

18. (C) Memo, C/S, USA, to SecDef, 27 Jun 55, C.E. Wilson Papers, RG 330.

19. (U) Kolodziej, The Uncommon Defense, pp 230-32.

20. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol III, Pt 2, 253-304, provides the best basic account of early intelligence gathering.

21. (S) Interview with Keeny, 22 Jul 75.

22. (S) Interview with Loftus, 14 Aug 75.

23. (S) The allegation comes from an interview with MajGen George Keegan, 14 Jul 75, by A. Goldberg et al, and from (S) T.W. Wolfe, "Impressions of Interview with Major General Keegan." Other interviews touching on the point in addition to those with Keegan and Loftus cited above, are ones by A. Goldberg et al with (S) John Funkhouser, 11 Sep 75; (S) Daniel Graham, 18 Jul 75; (S) Inlow, 4 Aug 75; (C) LeMay, 15 Aug 75; (C) Nitze, 18 Jul 75; (S) John Paisley, 23 Jul 75; (S) Randolph Payne, 21 Jul 75; (S) William Pond, 5 Aug 75; (S) Seidel, 24 Jul 75; (S) Howard Stoertz, 5 Aug 75; and (C) Maxwell Taylor, 24 Jul 75.

24. Caught in the Act: Facts about U.S. Espionage and Subversion against the U.S.S.R. (Moscow, 1960).

25. The following paragraphs draw on interviews cited in footnote 23 above and, further interviews by A. Goldberg et al with (C) Cline, 8 Jul 75; (S) John Huizinga, 9 Jul 75; (C) Komer, 3 Jul 75; and (C) Edward Proctor, 1 Jul 75; and (TS) "Administrative History of OSR" (CIA Internal Document).

26. (S) Interview with Keegan, 14 Jul 75. In this instance, there is confirmatory evidence in (S) interview with Huizinga, 9 Jul 75.

27. (TS) CIA, "Admin History of OSR" Office of Strategic Research.

28. (TS) SNIE 11-7-54, 14 Aug 54.

29. (TS) Gleason Mins, 185th NSC Meeting, 17 Feb 54.

30. (TS) Gleason Mins, 194th NSC Meeting, 29 Apr 54; (TS) memo, Ch, JCS, to SecDef, 21 May 54, C.E. Wilson Papers, RG 330.

31. (S) Interview with Payne, 21 Jul 75; (TS) NIE 11-7-55, 23 Jun 55. See Appendix 7, Table 15, for actual numbers.

32. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol I, I-i, see (TS) FY 1956 Budget Folder (McNeil file).

33. (U) Kolodziej, The Uncommon Defense, pp 232-38.

34. (TS) Memcon, (Col. A.J. Goodpaster) President, Radford, and Taylor, 24 May 56, Whitman file, Eisenhower Papers, Eisenhower Library, Abilene, Ks.

35. (TS) Lulejian, "Carriers," Pt 2, 19-20.

36. Except when otherwise noted, this section draws upon (TS) USAF, "Competition," Vol I, chap 5, and appropriate parts of Vol III; (TS/RD) BDM, Bk II, 46-78; and (S/RD) Lulejian," US. Submarines," Pt 1.

37. (TS/RD) JCS Chron, entry for 3 Jun 53; (S) USecAF to SecDef, 29 Oct 53, ibid.

38. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol V, Pt 1, 374-75.

39. (S) USecAF to SecDef, 24 Oct 53, RG 330, CD 470 (1953); Hewlett and Duncan, AEC History, pp 489-91.

40. (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol 203, 459.

41. (S) Interview with Keegan, 14 Jul 75; (S) interview with Keeny, 22 Jul 75; (C) interview with Komer, 3 Jul 75; (S) interview with Pond, 5 Aug 75; (TS) NIE 11-3-54, 16 Feb 54.

42. (TS) Max Rosenberg, "Plans and Policies for the Ballistic Missile Initial Operational Capability Program"(USAF Hist Div Liaison Office, Feb 60), pp 5-8; (S/RD) Bruno Augenstein, "A Revised Development Program for Ballistic Missiles of Intercontinental Range," Rand Study TS-937, 8 Feb 54; (U) Recommendations of the Strategic Missiles Evaluation Committee (Teapot Report), 10 Feb 54.

43. (S) USAF, "Competition," Vol V, 160; (TS/RD) Bowen and Little, "AF Atomic Energy Program," Vol V, Pt 2, 108-109.

44. (U) Memo by Simon Ramo, 1 Feb 54, AF History files; (U) Memo, Ramo for Gardner, 10 Feb 54, ibid.; (TS/RD) JCS Chron, entry for 16 Feb 54; (S) interview with Inlow, 4 Aug 75; (S) interview with Pond, 5 Aug 75; (U) USAF, "Competition," Vol V, 110; (TS) NIE 11-6-54, 5 Oct 54, in JCS Historical Div, Chronology of Significant Events and Decisions Relating to the U.S. Missile and Earth Satellite Development Programs, May 1942 through October 1960, original and 3 supplements (hereafter referred to as JCS, Events and Decisions), p 41; (TS) NSC 5501, 7 Jan 55.

45. (TS) Science Advisory Committee, Technological Capabilities Panel, Report to the President, "Meeting the Threat of Surprise Attack," 14 Feb 55.

46. (TS) Acting SecDef to Service Secs, 1 Mar 55, NSC 5522; (TS) Bonesteel to NSC Planning Bd, 5 Apr 55; JCS to SecDef, 18 Apr 55; (TS) DeptDef, Statement, 3 Jun 55.

47. (TS) NSC Record of Actions, 28 Jul 55; (S) interview with Inlow, 4 Aug 75: interview with Proctor, 1 Jul 75; (TS) "Administrative History of OSR."

48. (TS/RD) JCAE, Military Applications Subcommittee Report, RG 330, 319.1 JCAE; (TS) NSC Record of Actions, 8 Sep 55, NSC 5522.

49. (TS) SecArmy to SecDef, 6 Sep 55, RG 330, 470 Minutes; Rosenberg, "Plans and Policies," pp 22-25.

50. (S/RD) Lulejian, "U.S. Submarines," Pt III, III-1-9; Charles H. Donnelly, The United States Guided Missile Program, printed for Senate Armed Services Committee, 86th Cong, 1st sess, (Washington, 1959), p 99.

51. (S) DepSecDef to Adm D.B. Duncan, 17 Nov 55, RG 330, 470 Minutes; (C) Alfred Goldberg, "A Brief Survey of the Evolution of Ideas about Counterforce," Rand RM-5431-PR, Oct 67.

52. (S) Report, Gen Mgr, AEC, "Weapons Development," 7 Dec 62.

53. (S) Memcon, (Col. A.J. Goodpaster) President and DeptDef officials, 1 Aug 56, Ann Whitman file, Eisenhower Papers, Eisenhower Library, Abilene, Ks.; (U) memcon, President and Duncan Sandys, 1 Feb 57, ibid; memo by SecDef, ibid; (C) interview with Cline, 8 Jul 75.

54. Except where otherwise noted, this section relies upon (TS/RD) BDM, Bk I, I-19-120, Bk II, IV-5-102, IV-162-299, and Bk III, Appendices A,B,C,D, and F, and particularly on a series of research memoranda prepared by Ronald Hoffman for this study.

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56. (TS) Gleason Mins, 147th NSC Meeting, 29 May 53; (TS) C.P. Noyes to DepSecDef, 29 May 53, RG 330, CD 334 (NSC).

57. (TS) Gleason Mins, 148th NSC Meeting, 4 Jun 53; (TS) notes on Planning Bd Meeting, 6 Jun 53, RG 330, CD 334 (NSC).

58. (TS) NSC 159, "Continental Defense," 22 Jul 53, pp 4-7; (TS) M.S. Boggs Mins, 157th NSC Meeting, 30 Jul 53; (TS) Gleason Mins, 158th NSC Meeting, 6 Aug 53; (TS) NSC Record of Actions, 6 Aug 53.

59. (TS) Gleason Mins, 160th NSC Meeting, 27 Aug 53; (TS) Gleason Mins, 229th NSC Meeting, 21 Dec 54.

60. (S) Memo, McNeil to SecDef, 9 Sep 53, with draft memo, SecDef to Cutler, FY 1955 Budget (McNeil files); (TS) Gleason Mins, 163d NSC Meeting, 24 Sep 53; (TS) Gleason Mins, 172d NSC Meeting, 23 Nov 53.

61. (TS) Ch, JCS, to SecDef, 21 Dec 53, RG 330, CD 381 (Continental Defense).

62. (TS) Gleason Mins, 172d NSC Meeting, 23 Nov 53; (U) memo by Dir, BoB, 5 Dec 53, Whitman file, Eisenhower Papers, Eisenhower Library, Abilene, Ks.; (TS) McNeil to SecDef, 5 Dec 53, FY 1955 Budget (McNeil files); (TS) SecNav to SecDef, 4 Dec 53, ibid; (TS) Gleason Mins, 176th NSC Meeting, 16 Dec 53; (TS) NSC 5408, "Continental Defense," 11 Feb 54.

63. (TS) Gleason Mins, 168th NSC Meeting, 29 Oct 53.

64. (TS) SNIE 11-54, 9 Feb 54; (TS) NIE 11-2-54, 16 Feb 54; (TS) NSC 5408, "Continental Defense," 11 Feb 54; (TS) Gleason Mins, 185th NSC Meeting, 17 Feb 54; (TS) NSC Record of Actions, 17 Feb 54.

65. (S/RD) "Active Air Defense... 1954-1960," 1 Mar 54, State Dept. Lot File 57 D-688, Box 825.

66. (TS) Cutler to SecDef, 28 Oct 53, RG 330, 381 (Continental Defense).

67. (TS) Ibid; (TS) Gleason Mins, 194th NSC Meeting, 29 Apr 54; (TS) Gleason Mins, 163 NSC Meeting, 24 Sep 53.

68. (TS) Gleason Mins, 200th NSC Meeting, 3 Jun 54.

69. (TS) Gleason Mins, 200th NSC Meeting, 24 Jun 54; (TS) Gleason Mins, 198th NSC Meeting, 20 May 54.

70. (TS) Gleason Mins, 205th NSC Meeting, 1 Jul 54; (TS) Gleason Mins, 208th NSC Meeting, 29 Jul 54; (TS) Gleason Mins, 209th NSC Meeting, 5 Aug 54; (TS) NSC 5422/2, 7 Aug 54.

71. (TS) Gleason Mins, 163d NSC Meeting, 24 Sep 53.

72. (TS) Gleason Mins, 225th NSC Meeting, 24 Nov 54.

73. (TS) Gleason Mins, 228th NSC Meeting, 9 Dec 54.

74. (TS) Gleason Mins, 227th NSC Meeting, 3 Dec 54.

75. (TS) NSC 5501, 7 Jan 55.

76. (TS) "Meeting the Threat of Surprise Attack," 14 Feb 55.

77. (TS/RD) JCS Chron, entry for 2 Jun 55.

78. See, for example, (TS) NSC 5606, 5 Jun 56.

79. (TS/RD) JCS Chron, entry for 9 Sep and 13 Nov 54.

80. (TS) Glenn V. Gibson to DepSecDef, 31 May 56, RG 330, C.E. Wilson Papers, RG 330.

81. (TS) Cutler to SecDef, 12 Oct 54, RG 330, 381 (Continental Defense).

82. (TS) NIE 11-6-54, 5 Oct 54. in JCS, Events and Decisions, p 41; (TS) NSC 5501, 7 Jan 55.

83. (TS/RD) JCS Chron, entry for 2 Jun 55; (TS) NSC 5606 5 Jun 56.

84. (TS) Memcon, U.S.-U.K. Meeting on Missiles, 29 Jan 57, RG 330, Atomic 032 (Hearings).

85. (TS) NSC 5724, 7 Nov 57.

86. (TS/RD) JCS Chron, entry for 4 Dec 57.

87. (TS) NSC 5802, 13 Feb 58.

88. (U) U.S. Delegation to UN Disarmament Commission, Proposal, 5 Apr 52, in U.S. Dept State, American Foreign Policy, 1950-1955: Basic Documents (Washington, 1957), Vol II, 2750-59 (quotation on p 2951); (U) working paper submitted by the United States, the United Kingdom, and France.... 28 May 52, ibid, 2760-64.

89. (TS) Gleason Mins, 132d NSC Meeting, 18 Feb 53.

90. (TS) Gleason Mins, 136th NSC Meeting, 11 Mar 53; (TS) Gleason Mins, Special NSC Meeting, 31 Mar 53.

91. (U) Speech, 16 Apr 53, in American Foreign Policy, Vol II, 2794.

92. See (U) Eisenhower, Mandate, pp 252-55.

93. (S) Memo, Eisenhower to C.D. Jackson, 31 Dec 53, Whitman file, Eisenhower Papers, Eisenhower Library, Abilene, Ks.

94. (S) Memo, J.W. Hanes, Jr., for Whitman, 3 Mar 54, ibid; (S) memo by G. Smith, 16 Jun 54, State Dept Lot File 57 D-688, Box 821; (TS) NSC 112, 26 May 54; (TS) Gleason Mins, 203rd NSC Meeting, 23 Jun 54.

95. (TS) NSC 5501, 6 Jan 55; (TS) Gleason Mins, 229th NSC Meeting, 21 Dec 54.

96. (TS/RD) Smith to SecState, 24 Mar 55, State Dept Lot File 57 D-688, Box 821; (TS) DepUSecState to USecState, 22 Mar 55, ibid; (TS) NIE 11-2A-55, 26 Apr 55.

97. (TS) Memcon, Defense, AEC, and State officials, 25 Mar 55, State Dept Lot File 57 D-688, Box 821; (TS) memo by D. Anderson, 20 Jun 55, ibid.

98. (U) State Department Bulletin, 30 May 55, pp 904-905.

99. (S) NSC 5524, 27 Jun 55. The copy in ISA files contains extensive notes on State-JCS differences.

100. (C) Cable, Dulles to ActgSecState, 21 Jul 55, State Dept Lot File 63 D-123; (S) USDel/MC/15, 22 Jul 55, ibid; (C) USDel/MC/23, 23 Jul 55, ibid; (S) USDel/MC/25, 23 Jul 55, ibid.

101. (C) Ltr, SecState to SecDef, 17 Aug 55, RG 330, C.E. Wilson Papers, RG 330.

102. (S) Diary, 8 Feb 56, Whitman file, Eisenhower Papers, Eisenhower Library, Abilene, Ks.; (TS) NSC 5602/1, 15 Mar 56; (TS) NSC Record of Actions, 15 Mar 56.

103. (TS) JCS Historical Division, Extended Chronology of Significant Events Relating to Disarmament, original and 2 supplements (hereafter cited as JCS, Disarm Chron), entries for 31 Aug, 7 Sep, 3 Oct, 22 Oct, and 23 Oct 56; (TS) Cutler to President, Capital 187, 172137Z 1956.

104. (S) Memo, Cutler to SecState, w/attachment, 17 May 57, RG 330, C.E. Wilson Papers, RG 330; (TS) memo, Cutler to SecState, 27 May 57, ibid.

105. (TS) JCS, Disarm Chron, entries for 8 Aug, 7 Oct 57; (U) New York Times, 24 Sep 57.

NOTES

CHAPTER VI

1. (U) "OSD Chron," Vol I, 71, 72, 76, 83; (U) Lulejian, "Addenda to Chronology...United States," p 5.

2. (U) Pravda, 7 Nov 48.

3. (U) Current Digest of the Soviet Press (CDSP), citing Pravda, 5, 16, 26 Jan, 20 Feb 49; Izvestia, 14 Jan 49. Subsequent citations of Soviet press in this chapter only are from CDSP.

4. (U) Izvestia, 19 Mar 49.

5. (S) Becker and Brunner, "Evolution," pp 25, 36.

6. (U) Izvestia, 19 Mar 49.

7. (U) CIA, "Estimated Soviet Defense Spending in Rubles, 1970-1975," SR 76-10121U (May 76).

8. (S) Becker and Brunner, "Evolution," pp 36, 38.

9. (S) Ibid, pp 3-18.

10. (U) Khrushchev Remembers, Vol I, 367-73.

11. (U) Izvestia, 1, 2 Jul, 12 Aug 49; Pravda, 12 Sep, 3, 6 Oct 49 and 20 Jun 50.

12. (U) Khrushchev, "Secret Speech" of 1956, in Bertram Wolfe, Khrushchev and Stalin's Ghost (New York, 1957), p 200.

13. (TS/RD) British Study (Mackintosh) "The Soviet High Command," p 2 (1945-53), SC-04241/65, CSDB 312/00641-65.

14. (TS/RD) Ibid. In unclassified writing, the same author is not so explicit about Zhukov's assignment prior to recall to Moscow in 1952; (U) Mackintosh, Juggernaut, p 284. Whatever the source for the classified report, it did not come to the attention of the Marshal's English-language biographers. See (U) Otto Preston Chaney, Jr., Zhukov (Norman, Okla., 1971), pp 350-53. The fact there cited (p 351) that Zhukov was officially reported to have accompanied Molotov to Warsaw in July 1951, just prior to the shakeup of the Polish high command, does, however, lend credibility to the allegation in the classified report.

15. (U) Boris Nicolaevsky, Power and the Soviet Elite (New York, 1965), pp 250-51.

16. (U) Pravda, 30 Apr, 8 Aug, 3 Dec 49, 4 Feb 50; Izvestia, 10 Feb, 23 Mar, 11, 12, 13, 15, 16 Apr 50, 5, 8 Jul, 25 Aug 51; Krasnaya Zvezda, 27 Apr 51; Trud, 11 Nov 50; Literaturnaya Gazeta, 13 Sep 51; (U) Khrushchev Remembers, Vol II, 11.

17. (S) Becker and Brunner, "Evolution," pp 25, 26.

18. [redacted]

19. (TS/RD) BDM, Bk II, V-37; (TS-Codeword) DIA, "Soviet Aviation Industry Design Resources," SAO/ST-SS-01-104-73, p 67.

20. (S) USAF, "Competition," Vol III, 23-50.

21. (TS) DIA, "Soviet Aviation," p 63; (S) CIA, "Production," (S) USAF, "Competition," Vol III, 58.

22. (TS) DIA, "Soviet Aviation," p 63; [redacted]

23. [redacted]

24. (S) Ibid.

25. (U) Tokaev, Stalin Means War, pp 114-18.

26. (U) K.A. Vershinin, quoted in Pravda, 18 Jul 48.

27. [redacted]
(U) Vladimirov, Space Bluff, pp 72-73.

28. (U) Matthew Gallagher and Karl Spielmann, Jr., eds , Soviet Decision-Making for Defense (New York, 1972), pp 20-21.

29. (TS) DIA, "Soviet Aviation," p 17.

30. (S) Becker and Brunner, "Evolution," II-17, (S) "Evolution, 1952-64," pp 16, 22.

31. (U) MccGwire, pp 74-78; (U) "Current Soviet Warship Construction," MccGwire (ed), Soviet Naval Developments, (New York, 1973), pp 136-43; (S) ONI, "A Survey of Soviet Naval Construction (May 1953).

32. (S) Lulejian, "Soviet Submarines," Pt 1, 22, 32.

33. (S) Herrick, pp 63-64.

34. (U) MccGwire, p 78.

35. (U) K.J. Moore et al, "Developments in Submarine Systems," in MccGwire, ed , Soviet Naval Influence (New York, 1977), p 153, provides quite as much information on this topic as classified reference works such as (S) Lulejian, "Soviet Submarines," Pt 1, 22-23, or [redacted]

36. (S) Becker and Brunner, "Evolution, 1952-64," 37-40.

37. (S) CIA, "Production."

38. (U) Noteworthy examples of stepped-up Soviet attention to colonial "liberation" movements are Malenkov's election speech of 9 Mar 50 and feature articles in Izvestia for 6 Oct 51, 13 Feb and 23 May 52.

39. Reply of Soviet delegate to the UN to Yugoslav complaint, 28 Nov 51, in Stephen Clissold, ed, Yugoslavia and the Soviet Union 1939-1973: A Documentary Survey (London, 1975), p 244.

40. (U) Unpublished transcript of Khrushchev tapes, cited in (S) Arnold L. Horelick, "The Political Context of Soviet Decision-Making, 1953-1964," Attach No. 3 to Rand L-132 (17 Nov 75), p 5.

41. (TS/RD) BDM, Bk II, V-44-48, V-116-20.

42. [redacted]

43. (TS) DIA, "Soviet Aviation," p 23; (TS) ; DIA, "Aerospace Research, Development and Test Facilities, "TCS-692191/71, SAO/ST-SS-01-69-72 (1 Oct 71), pp 53, 65.

44. (TS/RD) BDM, Bk II, V-101-103.

45. (U) G.A. Tokaty, "Soviet Rocket Technology," in Emme, Rocket Tech, pp 279-81.

46. [redacted]

47. (TS) Ibid; (TS) DIA, "Soviet and People's Republic of China Nuclear Weapons Employment and Strategy," TCS-654775-72, 1972, pp 1-D-32; (S) USAF, "Competition," Vol I, 441-43.

48. (U) Voroshilov, speech of 9 Mar 50; (TS) USAF, "Competition," Vol I, 375-76; Pravda, 6 Oct 51.

49. (U) Nicolaevsky, pp 115-19.

50. (U) Ibid, pp 130-47.

51. (U) Lester A. Sobel (ed), Russia's Rulers: The Khrushchev Period (New York, 1971), p 21.

52. (U) Nicolaevsky, pp 105-109.

53. (U) Ibid, pp 137-57; (U) Joseph Alsop, ibid, p 135; (U) Robert Conquest, Power and Policy in the U.S.S.R. (New York, 1961), pp 264-69.

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55. (U) Roy A. and Zhores A. Medvedev, Khrushchev: The Years in Power (New York, 1976), p 54.

56. Adam B. Ulam, Expansion and Coexistence: The History of Soviet Foreign Policy, 1917-1973 (New York, 1974), pp 562-70; (U) Lincoln P. Bloomfield et al, Khrushchev and the Arms Race: Soviet Interests in Arms Control and Disarmament, 1954-1964 (Cambridge, Mass., 1966), 2nd ed, pp 21-58.

57. (U) Sobel, p 107.

58. (U) Conquest, pp 292-302.

59. See (U) Roman Kolkowicz, The Soviet Military and the Communist Party (Princeton, 1967), pp 113-34, and Timothy Colton, "The Zhukov Affair Reconsidered," Soviet Studies (Apr 77).

60. Except where otherwise noted, the description of Soviet budget allocations and force posture hereafter draws on (S) Becker and Brunner, "Evolution, 1952-1964," pp 4-10.

61. [redacted]

62. (U) Khrushchev Remembers, Vol II, 52; for Varentsov's career, see (TS), "The High Command of the SRF," SC-01985-63, CSDB-3/653, 130 (6 Feb 53).

63. (TS) Ibid; [redacted]

64. (U) MccGwire, Soviet Naval Developments, pp 140-41.

65. (U) Ibid; (TS) DIA, "Soviet and PRC Nuclear Weapons Employment," pp 1-B-39; (U) James McConnell, "The Gorshkov Articles," in MccGwire, Soviet Naval Influence, pp 565-617.

66. Except where otherwise noted, this section draws upon (TS) USAF, "Competition," Vol I, 365-88.

67. An effort to assemble retrospective data comparable to that in (S-CNWDI) USAEC, Stockpile, could, if successful, permit some comparisons of the priorities assigned to particular fuel and weapons projects and to economic as opposed to military applications.

68. (C) There is some evidence from defectors that security-force control of weapons remains a regular practice. See (C) interrogations of a former private in the SRF, K-311/01026-76.

69. (U) Horelick, Rand L-132, pp 28-30.

70. Most of what follows is based on (U) Garthoff; (U) H.S. Dinerstein, War and the Soviet Union (New York, 1962); (U) Wolfe, Soviet Strategy at the Crossroads; (U) Horelick and Rush, Strategic Power; (U) William R. Kinter and Harriet Fast Scott (eds), The Nuclear Revolution in Soviet Military Affairs (Norman, Okla, 1968); and (U) John Erickson, Soviet Military Power (London, 1971).

71. (U) Garthoff, pp 61-62.

72. (U) Kramish, pp 124-125, 129; (U) Dinerstein, p 222.

73. (TS) DIA, "Soviet and PRC Employment of Nuclear Weapons;" (U) Sovetsky flot, 5 Jan 55.

74. (U) Dinerstein, pp 36-49. Discussion below of the debate prompted by Talensky's article draws primarily on Dinerstein's account.

75. (U) Ibid, pp 67-71; (U) Pravda, 10 Dec 53; (U) Izvestia, 11 Dec 53.

76. (U) Dinerstein, pp 70-88. The quotation is on p 79.

77. (U) Ibid, pp 48, 119-22; (U) Bloomfield et al, Khrushchev, p 21; (U) Pravda, 7 Nov 54.

78. (U) Pravda, 23, 28 Dec 54; (U) Krasnaya zvezda, 24 Dec 54; (U) Dinerstein, pp 124-25.

79. (U) Ibid, pp 141-42; (U) Pravda, 7 Jan 55.

80. (U) Dinerstein, pp 139-47; (U) Conquest, pp 260-61.

81. (U) Kolkowicz, pp 113-114; Sobel, p 45.

82. The turn is fully described in (U) Dinerstein, pp 184-94.

83. A full translation is available as "World-Wide Historic Victory of the Soviet People," Rand T-110 (29 Jan 59).

84. (U) Dinerstein, pp 217-19, 237.

85. (TS) USAF, "Competition," Vol I, 415, Vol III, pp 45, 48, 57, 61; (TS) DIA, "Soviet and PRC Nuclear Weapons Employment and Strategy."

86. (U) Horelick, Rand L-132, p 56.

87. (TS) USAF, "Competition," Vol I, 413-14, Vol III, 57; (U) A.J. Alexander, R&D in Soviet Aviation (RAND R-589-PR, 1970); (U) L.M. Olshchevits et al (eds), Organizatsiya, planirovanie i ekonomika aviatsonnoga proizvodstva (Moscow, 1963), pp 53-57, 70-72.

88. (U) Horelick, Rand L-132, table VII.

89. [redacted]

90. [redacted]

91. (TS) DIA, "Soviet Aviation," pp 43, 67, 74. Antonov's plant had been at Novosibirsk and was relocated at Kiev in 1951, after Khrushchev had transferred to Moscow, but this plant was greatly expanded in size in 1956-57, presumably reflecting a special allocation of funds made after Khrushchev gained ascendency over Malenkov; ibid, pp 5-7.

92. (U) Horelick, Rand L-132, App, table V, lists Aladinsky; (TS) Mackintosh, "The Soviet High Command," names Sudets.

93. (U) Khrushchev Remembers, Vol II, 39-40.

94. (TS/RD) BDM, Bk II, IV-7-21, IV-50-59.

95. [redacted] (U) Washington Post, 17 Oct 65.

96. (TS), Karl F. Spielmann, "Soviet Decision-Making in Defense R&D," TCS 95804/74 (Aug 74).

97. (U) Tokaty, pp 271-84.

98. [redacted] (TS) USAF, "Competition," Vol I, 432-33.

99. (U) 50 let vooruzhennykk sil SSSR (Moscow, 1968), p 485; (U) Tokaty, p 279; (U) David Holloway, "Military Technology," in R. Amann et al (eds), The Technological Level of Soviet Industry (New Haven, 1977), pp 457-58.

100. (U) Tokaty, p 281.

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102. (TS) USAF, "Competition," Vol I, 433-34; (S) ibid, Vol III, 99.

103. (TS) NIE 11-2-65, pp 11-13; (S) USAF, "Competition," Vol III, 96,100.

104. [redacted] (S) USAF, "Competition," Vol III, 106-110.

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109. Tokaty, pp 280-81.

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CHAPTER VII

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2. (S) Thomas W. Wolfe and Fritz Ermarth, The Interaction Process and its Influence on Major Soviet Arms Decisions, R-1180-PR, (Aug 73), pp 83-86.

3. (U) Further discussion of Soviet attitudes during this period on the likelihood of war may be found in Wolfe, Soviet Strategy, pp 115-17.

4. (U) See Khrushchev Remembers, Vol II, 443-44.

5. (U) Col S. Lipitsky, "Activity of an Aggressor in the Period When War Threatens," Military-Historical Journal, No 8 (Aug 63), pp 11-24.

6. (U) Frank Gibney, ed, The Penkovsky Papers (New York, 1965), p 251.

7. (U) Ulam, pp 619-39; James L. Richardson, Germany and The Atlantic Alliance (Cambridge, Mass., 1966), pp 264-71; Thomas W. Wolfe, Soviet Power and Europe: 1945-1970, (Baltimore, 1970), pp 89-91, 113-14.

8. (U) Khrushchev Remembers, Vol II, 13. See also the first volume of these memoirs, pp 515-16.

9. (U) Soviet government note of 27 Apr 57 in Pravda, 28 Apr 57.

10. (U) "The Origin and Development of the Differences Between the Leadership of the CPSU and Ourselves," Peking Review, No 37, 13 Sep 63.

11. (U) Joint People's Daily--Red Flag article, 6 Sep 63.

12. (U) See Ulam, pp 621-31.

13. (U) Peking Review, No 36, 6 Sep 63.

14. (U) For a detailed analysis of Khrushchev's internal opposition and its challenges to his power, see Michel Tatu, Power in the Kremlin, (New York, 1970), pp 19-37. See also Ulam, pp 581-613.

15. (U) Tatu, p 57.

16. (U) Alec Nove, The Soviet Economy, (New York, 1969), pp 72-81; Andrew Sheren, "Structure and Organization of Defense-Related Industries," in U.S. Congress, Jt Economic Committee, Economic Performance and the Military Burden in the Soviet Union, 91st Cong, 2nd sess, p 126.

17. (U) Nove, p 72.

18. (U) Wolfgang Leonhard, The Kremlin Since Stalin, (New York, 1962), p 311.

19. (U) See Wolfe, Soviet Power, p 94.

20. (U) Plenary session of March 1962, verbatim records, p 426, cited by Tatu, p 215.

21. (U) "Disarmament is the Path toward Strengthening Peace and Ensuring Friendship Among Peoples," Pravda, 15 Jan 60.

22. (S) See CIA SCAM-74, Appendix VII, table 26.

23. (S) See CIA SCAM-74, Appendix VII, table 30.

24. (S) Ibid; (S) Becker and Brunner, "Evolution," p 46.

25. (S) Derived from SCAM-74; (S) BDM, Bk I, II-70.

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27. (S) Ibid.

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30. (TS/RD) Ibid, Bk II, V-75.

31. (TS/RD) Ibid.

32. (TS/RD) Ibid, pp V-102-104, 152, Bk I, II-65.

33. (TS/RD) Ibid, Bk I, II-65, Bk II, V-104-105, 152.

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37. (S) Khrushchev Remembers, Vol II, 51; (S) USAF, "Competition," Vol I, 416-19, Vol II, 34, 47, 61.

38. (S) USAF, "Competition," Vol III, 34-35.

39. (S) Ibid, pp 47-48, 61-62.

40. (S) Ibid, pp 70-71, 76-77; Horelick, Rand L-132, p 60.

41. (S) USAF, "Competition," Vol III, pp 96-101, 106-111.

42. (S) Ibid, pp 116-22.

43. (S) The foregoing discussion is drawn from Wolfe and Ermarth, pp 275-83.

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45. (TS) Lulejian, "Soviet Submarines," Vol I, Pts II and III, II-40; (S) USAF, "Competition," Vol III, 288-94.

46. (TS) Lulejian, "Soviet Submarines," Vol I, Pts II and III, II-17-21, 52, III-17-19, 24-30; (S) USAF, "Competition," Vol III, 300-306.

47. (S) The ensuing discussion of the SS-6 is based on (S) USAF, "Competition," Vol I, 446-49, 452-54, Vol III, 128-34.

48. (U) Khrushchev Remembers, Vol II, 46.

49. (U) Horelick, Rand L-132, Pt 1, 64-65.

50. From unpublished transcript of Khrushchev tapes, cited by Horelick, Rand I-132, p 66.

51. (U) Khrushchev Remembers, Vol II, 48.

52. (S) The ensuing discussion of the SS-7 and SS-8 is drawn from (S) USAF, "Competition," Vol I, 452-56, Vol III, 137-57; Horelick, pp 68-69.

53. (U) Horelick, Rand L-132, Pt 1, 69.

54. (TS/RD) "OSD Chron," USSR-Vol III, 60-64.

55. (U) Khrushchev Remembers, Vol II, 48-49.

56. (U) Khrushchev Remembers, Vol I, 516-17, Vol II, 535.

57. (U) A detailed examination of the Soviet claims, upon which this account draws, may be found in Horelick and Rush, Strategic Power.

58. (U) Documents on International Affairs, 1958 (London, 1962) p 301, cited by Ulam, p 616.

59. (U) Krasnaja Zvezda, 4, 22 Feb 59.

60. (U) Pravda, 15 Nov 59.

61. (U) For discussion of the Soviet military literature bearing on this subject, see: Wolfe, Soviet Strategy, pp 76, 168-71; Raymond L. Garthoff, Soviet Military Policy: A Historical Analysis (New York, 1966), pp 58-60.

62. (U) Gibney, pp 214, 220, 244.

63. (U) Ulam, p 636.

64. (U) Pravda, 19 Jan 61.

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CHAPTER VIII

1. (S) Interview with Inlow, 4 Aug 75, p 4.

2. (TS) NIE 11-6-54, "Soviet Capabilities and Probable Program in the Guided Missile Field," 5 Oct 54, in JCS, Events and Decisions, p 41.

3. (S) Interview with Inlow, 4 Aug 75, pp 1-4; (C) interview with Komer, 3 Jul 75, p 2; (C) interview with LeMay, 15 Aug 75, p 5; (S) interview with Seidel, 24 Jul 75.

4. (S) Interview with Pond, 5 Aug 75, pp 1-2; (S) interview with Inlow, 4 Aug 75, p 1.

5. (S) Interview with Seidel, 24 Jul 75, p 2.

6. (S) Interview with Inlow, 4 Aug 75, pp 3-4.

7. (TS) JCS 1620/162, "Missile Report for Senate Preparedness Committee," 23 Oct 57, in JCS, Events and Decisions, p 102.

8. (TS) NIE 11-4-57, "Main Trends in Soviet Capabilities and Policies, 1957-1962," 12 Nov 57, in JCS, Events and Decisions, Supplement I, p 4.

9. (TS) SNIE 11-10-57, "The Soviet ICBM Program," 10 Dec 57, in ibid, p 12.

10. (TS) JCS, Events and Decisions, Supplements I and II, events of 26 Feb, 19 Aug, 23 Dec 58, 8 Sep 59.

11. (C) Interview with Proctor, 1 Jul 75, p 2.

12. (S) Interview with Graham, 18 Jul 75, p 4; (S) interview with Inlow, 4 Aug 75, pp 2, 5.

13. (S) Interview with Payne, 21 Jul 75, pp 3-4; (C) interview with Komer, 3 Jul 75, pp 3-4; (S) interview with Stoertz, 5 Aug 75, p 3.

14. (C) Interview with Komer, 3 Jul 75, p 1; (S) interview with Proctor, 1 Jul 75, p 1; (S) interview with Huizinga, 9 Jul 75, pp 2-3. MajGen George Keegan, AC/S Intelligence, Hq, USAF, disagreed with this view. (S) See Keegan interview, 14 Jul 75, pp 5-6; also (S) Wolfe version of Keegan interview, pp 5-6.

15. Interviews with (S) Stoertz, 5 Aug 75, p 2; (C) Proctor, 1 Jul 75, pp 2-3; (S) Graham, 18 Jul 75, p 1.

16. (S) Interviews with Graham, 18 Jul 75, pp 1-3; and Inlow, 4 Aug 75, p 5.

17. (S) Interviews with Graham, 18 Jul 75, p 1, and Inlow, 4 Aug 75, p 7.

18. (S) Interviews with Inlow, 4 Aug 75, pp 9-10, and Pond, 5 Aug 75, p 3.

19. Interviews with (S) Inlow, 4 Aug 75, p 9; (S) Stoertz, 5 Aug 75, p 2; (C) Proctor, 1 Jul 75, p 2.

20. (S) Interview with Stoertz, 5 Aug 75, pp 2-3.

21. (S) Interviews with Pond, 5 Aug 75, pp 1-3; Graham, 18 Jul 75, p 2; and Stoertz, 5 Aug 75, pp 1-3.

22. (S) Interview with Stoertz, 5 Aug 75, p 3.

23. (S) Ibid, pp 2-4.

24. (U) N.Y. Times, 12 Jan 59.

25. (S) Interviews with Keeny, p 5, and Inlow, 4 Aug 75, p 6.

26. Interviews with (S) Inlow, 4 Aug 75, p 5; (C) Proctor, 1 Jul 75, p 2.

27. (S) Interview with Inlow, 4 Aug 75, p 6.

28. (C) Interview with Proctor, 1 Jul 75, p 2.

29. (U) N.Y. Times, 6 Oct 57; St. Louis Post-Dispatch, 6 Nov 57.

30. (U) U.S. Cong, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, Hearings, Inquiry Into Satellite and Missile Programs, 85th Cong, 1st and 2nd sess.

31. (U) Congressional Record, 14 Aug 58, Vol 104, Pt 14, 17569-73.

32. (S) Science Advisory Committee (Gaither Committee), Security Resources Panel, "Deterrence and Survival in the Nuclear Age," (Washington, 7 Nov 57); (S) interview with Keeny, p 5.

33. (U) George B. Kistiakowsky, A Scientist at the White House (Cambridge, Mass., 1976), pp xxvi-xxvii, xxxvi, 336-37; (U) Dwight D. Eisenhower, The White House Years: Waging Peace, 1956-1961 (hereafter cited as Eisenhower, Waging Peace) (Garden City, N.Y., 1965), pp 219-23; (S) interview with Keeny, 22 Jul 75, p 5; (U) article by Chalmer M. Roberts in Washington Post, 20 Dec 57.

34. (U) Eisenhower, Waging Peace, pp 230-32.

35. (U) Horelick and Rush, Strategic Power, p 64.

36. SecDef Neil H. McElroy, Press Conference, Mins, 22 Jan 59, pp 5-8.

37. (U) Public Papers of the President, John F. Kennedy, 1961 (Washington, 1962), pp 67-68.

38. (S) Interviews with Inlow, 4 Aug 75, p 7, and Stoertz (Wolfe version), pp 3-4.

39. (S) Interview with Stoertz, 5 Aug 75, pp 2-4.

40. (S) Interviews with Inlow, 4 Aug 75, p 7, and Stoertz (Wolfe version), p 4.

41. (S) Interview with Stoertz (Wolfe version), p 4.

42. (S) Ibid.

43. (U) DeptDef Press Release No. 1173-61, 21 Oct 61.

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CHAPTER IX

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3. (U) U.S. Cong, House, Subcommittee of Committee on Appropriations, Supplemental Appropriations for 1958, Hearings, 85th Cong, 2nd sess, 28 Jan 58, pp 1-7.

4. (U) U.S. Cong, House, Subcommittee of Committee on Appropriations, Department of Defense Appropriation for 1959, Hearings, 85th Cong, 2nd sess, 28 Jan 58, pp 347-49.

5. (S) Jacob Van Staaveren, "USAF Intercontinental Ballistic Missiles, FY 1960-1961" (USAF Hist Div Liaison Office, 1964), pp 15-19, 25-29.

6. (U) See Public Papers of the Presidents of the United States, John F. Kennedy, 1961 (Washington, 1962), pp 24, 229-40.

7. (U) Ibid, pp 403-405.

8. (S) Comptroller, OSD, "Defense Budget and FYDP Breakdown Since FY 1945," 1976. For period 1945-72, see Appendix 7, table 31.

9. (S) USAF, "Competition," Vol IV, table VI-3, 115.

10. (S) Compiled from ibid, Annex 1, tables 3, 6D, and 6G.

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12. (S) Ibid, pp 81, 93-97; (U) DeptDef, Semiannual Report of the Secretary of Defense, January 1 to June 30, 1958 (Washington, 1959), p 26.

13. (S) Rosenberg, "Plans and Policies," pp 81-83.

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15. (S) USAF, "Competition," Vol II, 317, 487-88.

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17. (S) USAF, "Competition," Vol II, 380-81, 452-58.

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19. (S) Rosenberg, "Plans and Policies," pp 5-14.

20. (S) Ibid, pp 36, 85, 86.

21. (S) Rosenberg, "USAF Ballistic Missiles, 1958-1959," pp 13-14.

22. (S) USAF, "Competition," Vol II, 214-15, 225, 227, 241.

23. (S) Ibid, pp 231, 234-35, 254, 256; (S) Nalty, p 2.

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26. (S) USAF, "Competition," Vol II, 521, 527, 536; (S) Nalty, p 2.

27. (S) USAF, "Competition," Vol II, 336-41; (S) Rosenberg, "USAF Ballistic Missiles, 1958-1959," pp 31-40; (S) Van Staaveren, p V-62.

28. (S) USAF, "Competition," Vol II, 342; (S) Van Staaveren, pp 58, 69-70.

29. (S) USAF, "Competition," Vol II, 343.

30. (S) Ibid, pp 254, 346, 347, 359, 537; (S) Nalty, p 7.

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32. (S) Nalty, pp 12-14; (S) USAF, "Competition," Vol II, 356-58.

33. (S) Van Staaveren, pp 63-64; (S) Nalty, pp 18-20.

34. (S) Nalty, pp 7-11; (S) USAF, "Competition," Vol II, 334-35.

35. (S) Interview with Kent, 28 Jul 75; (S) notes of seminar on Strategic Arms Competition Study, 26 Mar 76, p 1.

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39. Lulejian, "U.S. Submarines," (S/RD) Pt 3, III-31-34, 55.

40. (C) USAF Statistical Digest, FY 1957, p 112; ibid, FY 1960, p 75; (C) ibid, 1962, pp 76, 83; (S) ibid, 1966, pp 4-5, 123; (TS) USAF, "Competition," Vol I, 188-89, 199.

41. (S) USAF Statistical Digest, FY 1963, p 16; (S) ibid, FY 1966, p 123.

42. (S) USAF Statistical Digest, FY 1966, p 123; (S) USAF, "Competition," Vol II, 156, 169; (TS) ibid, Vol I, 211; (U) Hqtrs, SAC, "Development of Strategic Air Command, 1946-1976," 21 Mar 76, pp 82, 113.

43. (TS) USAF, "Competition," Vol I, 211-22.

44. (TS) Ibid, pp 222-24; (S) ibid, Vol II, 195-206.

45. (U) Hqtrs, SAC, "Development," pp 59-60, 67, 76, 84, 90, 93, 115, 122.

46. (TS) Wainstein et al, Study S-467, pp 203-205, 214; (TS/RD) BDM, Bk II, IV-11, 13, 43, Bk III, F-48, F-50, F-57-60.

47. (TS) Wainstein et al, Study S-467, pp 207-208, 215-16, 339-40; (TS/RD) BDM, Bk I, I-128-30, Bk II, IV-39-40, Bk III, D-5-6, F-61-63.

48. (TS/RD) BDM, Bk II, IV-23-24, Bk III, D-7-9; (S) USAF Statistical Digest, FY 1960, p 14.

49. (TS/RD) BDM, BK II, IV-72-74, BK III, D-3-4, F-73; (S) USAF Statistical Digest, FY 1962, pp 18-20; ADC Statistical Data Book, II: Aircraft and Missiles, p 157.

50. (TS/RD) BDM, Bk I, I-129.

51. (TS/RD) Ibid, Bk II, IV-154-56; (TS) Wainstein et al, Study S-467, pp 216-18, 340.

52. (TS) Wainstein et al, Study S-467, pp 218-20, 344-47.

53. (TS) Ibid, pp 169-77.

54. (TS) Ibid, pp 239-48.

55. The discussion of the NIKE-ZEUS is based on (TS/RD) BDM, Bk I, I-108-09, 130-32, 135-39, Bk II, IV-95-120.

56. This discussion of civil defense is based on (TS/RD) BDM, Bk II, IV-195-202.

57. This discussion of strategic principles is based on the following sources: (TS) Wainstein et al, Study S-467, pp 145-53, 184-86; (S) Lulejian, "U.S. Submarines," Pt 3, III-12-19; (C) Alfred Goldberg, "Ideas about Counterforce," pp 13-21.

58. (C) Goldberg, "Ideas about Counterforce," pp 17-33.

59. (TS) JCS, SM 603-57, 16 Aug 57; (TS) JCS 1844/231, 22 Jul 57, 1844/236, 4 Oct 57, 1844/237, 20 Oct 57; (TS) Memo, Adm C. Buchanan for CNO, 9 Dec 57.

60. (S) Van Staaveren, pp I-57, VI-76-77; interviews by Goldberg et al with (S) Kent, 28 Jul 75, (C) Lemay, 15 Aug 75, (C) Miller, 2 Jul 75, (C) Taylor, 24 Jul 75 (Wolfe version also).

61. This discussion is based on the following sources: (TS) Wainstein et al, Study S-467, pp 179-94; (S/RD) Lulejian, "U.S. Submarines," Pt 3, III-37-48; interviews with (C) LeMay, (C) Miller, (S) Kent; (C) Goldberg, "Ideas about Counterforce," 14-16.

62. NES (Net Evaluation Subcommittee) 963-59, "Appraisal of Relative Merits, From the Point of View of Effective Deterrence, of Alternate Retaliatory Efforts," 30 Oct 59.

NOTES

CHAPTER X

1. This discussion draws extensively on (S) Wolfe and Ermarth, especially pp 275-83.

2. (U) Anatolii A. Gromyko, 1036 dnei presidenta Kennedy (The 1036 Days of President Kennedy), Politizdat, Moscow, 1968, p 211.

3. (S) Wolfe and Ermarth, p 276; (S) USAF, "Competition," Vol II, 35, 48, 62, 134, 146.

4. (S) USAF Statistical Digest, FY 1963, pp 13, 17; (S) Lulejian, "U.S. Submarines," Pt 3, 162.

5. (S) Wolfe and Ermarth, pp 55-59, 276.

6. (S) Ibid, p 277; Graham T. Allison, Essence of Decision, (Boston, 1971), p 138; Elie Abel, The Missile Crisis (New York, 1966), p 155.

7. (U) DoD Press Release No. 980-62, Remarks of Secretary of Defense Robert S. McNamara at the Commencement Exercises, Univ of Michigan, Ann Arbor, Mich., 16 Jun 62, p 9.

8. (S) Wolfe and Ermarth, p 56.

9. (U) Khrushchev Remembers, Vol I, 493.

10. (U) Ibid, p 499.

11. (U) Pravda, 13 Dec 62.

12. (U) Roberta Wohlstetter, Cuba and Pearl Harbor: Hindsight and Foresight, RM-4328-ISA, The Rand Corporation (Apr 65), p 8.

13. (U) Arthur M. Schlesinger, Jr, A Thousand Days (New York, 1965), p 821.

14. (U) Tatu, pp 236-39; Carl A. Linden, Khrushchev and the Soviet Leadership, 1957-1964 (Baltimore, 1966), pp 154-55.

15. (U) Allison, pp 116-17, 237-44.

16. (U) William Hyland and Richard Shryock, The Fall of Khrushchev (New York, 1968), p 33.

17. (U) U.S. Cong, House, Subcommittee of Committee on Appropriations, DoD Appropriation for 1964, Hearings, 88th Cong, 1st sess, Pt 1, 3.

18. (U) Ibid, pp 6-7; Allison, p 104.

19. (U) Khrushchev Remembers, Vol 1, 495.

20. (U) Wohlstetter, p 10; Allison, pp 105-106.

21. Allison, pp 43-45.

22. (U) Abel, p 47; (U) Schlesinger, pp 796-97; (U) Allison, pp 243, 327.

23. (U) The Chinese angle as a compelling factor behind the deployment of missiles to Cuba has been stressed by Ulam, p 669.

24. (U) Khrushchev Remembers, Vol I, 492-93; Khruschev Remembers, Vol II, 510-11.

25. (U) Krushchev Remembers, Vol I, 494.

26. (U) Hyland and Shryock, p 35.

27. (S) Wolfe and Ermarth, pp 278-79.

28. (U) Khrushchev Remembers, Vol I, 496.

29. (S) Wolfe and Ermarth, pp 278-80.

30. (U) Schlesinger, p 821.

31. (U) Abel, p 77.

32. (U) Hyland and Shryock, p 48. (U) Allison in Essence of Decision, pp 235-37, illustrates how the Soviets might have persuaded themselves that Kennedy would tolerate the Soviet missiles, despite U.S. warnings to the contrary.

33. (U) V.V. Zhurkin and E.M. Primakov, eds, Mezhdunarodnye konflikty (International Conflicts), (Moscow, 1972), pp 79, 80. The chapter on Cuba was written by Anatolii Gromyko, son of Foreign Minister Andrei Gromyko. It would appear that one purpose of the younger Gromyko's writings on Cuba was to vindicate his father, who may have been reproached for failing to alert Moscow on the intensity of the U.S. reaction.

34. (U) Wolfe and Ermarth, pp 280-81; Horelick and Rush, Strategic Power, p 151.

35. (U) Part of this internal airing of military views in the pages of Voennaia Mysl' (Military Thought) became available to the West through Penkovsky.

36. (U) For analysis of internal leadership reaction to the Cuban failure, see: (U) Tatu, pp 273-359; (U) Linden, pp 152-73; (U) Hyland and Shryock, pp 73-78.

37. (S) See, for example, Wolfe and Ermarth, p 100.

38. (U) See Khrushchev Remembers, Vol II, 49.

39. (S) USAF, "Competition," Vol I, 454-58, Vol III, pp 180-87; (S) Wolfe and Ermarth, pp 98-101; (TS) NIE 11-8-73, 25 Jan 74, pp 7,8.

40. The ensuing discussion of the SS-9 is based on the following sources: (S) USAF, "Competition," Vol I, 456-57, (S) Vol III, 162-69; (TS) NIE 11-8-73, 25 Jan 74, p 8, Supporting Analyses, pp 4, 7; (S) D.E. Benson et al, "Assessment of USSR Historical Strategic Postures" (Stanford Research Institute, 1970), p 15; Wolfe and Ermarth, pp 98-101, 227-28,232-35.

41. (S) USAF, "Competition," Vol III, 174-75; (TS) NIE 11-8-73, 25 Jan 74, pp 7-8.

42. (S) USAF, "Competition," Vol I, 458, (S) Vol III, 194-200; (TS) NIE 11-8-73, 25 Jan 74, Supporting Analyses, p 7; (S) Benson et al, p 15.

43. (S) USAF, "Competition," Vol III, 300-307; (S) Wolfe and Ermarth, pp 153-56: (TS) Lulejian, 'Soviet Submarines," Vol I, Pts 2 and 3, II-47-56, Vol II 12-14.

44. This discussion of Soviet strategic defense programs is based on the following sources: (TS/RD) BDM, Bk I, II-34-36, 50-51, 64-67, (S) Bk II, V-52, 71, 76-80, 83, 102-115; (S) Wolfe and Ermarth, pp 65-71, 118-120, 129.

45. See, for example: Tatu, pp 330-36; Linden, pp 166-73; Hyland and Shryock, pp 73-80.

46. (S) Wolfe and Ermarth, pp 99-100.

47. These figures, in billions of 1970 constant rubles, derive from the revised U.S. estimates of Soviet military spending. See Appendix VII, table 26 and CIA SCAM-74.

48. (U) See Khrushchev Remembers, Vol II, 535-36.

NOTES

CHAPTER XI

1. This theme is developed retrospectively by (U) Alain C. Enthoven and Wayne K. Smith in How Much is Enough? Shaping the Defense Program, 1961-1969 (New York, 1971). Enthoven was a key assistant to McNamara during the latter's tenure as Secretary of Defense.

2. See McNamara's posture statements before the House Armed Services Committee. See also (U) William W. Kaufmann, The McNamara Strategy (New York, 1964); (U) Charles J. Hitch, Decision-Making for Defense (Berkeley, 1965), pp 27-29; (U) Enthoven and Smith.

3. (TS) Draft memo, SecDef for President, sub: Recommended Department of Defense Program, 1963-1967, 30 Sep 61. This was the first of a series of annual memoranda, hereafter referred to as DPM.

4. (TS) NIE 11-8/1-61, 21 Sep 61. This was briefed to Secretary McNamara before 21 September.

5. (S) Memo, SecDef for President, 28 Apr 61.

6. (S) Memo, SecDef for President, 17 Aug 61.

7. (S) Statement on FY 1963-67 Defense program and 1963 Defense budget, SecDef McNamara before Subcommittee on DoD Appropriations of Senate Committee on Appropriations, 14 Feb 62, p 23. All such statements hereafter cited as Posture Statement).

8. (TS) Summary of Central War Offensive Forces, OSD, 17 Jul 61; (S) letter, Serial No. 0090P90, CNO and CMC to SecNavy, 15 Aug 61, enc 1, 4 Aug 61, p 1.

9. (TS) DPM, 23 Sep 61, App I, 2, 12-15.

10. (TS) Ibid, 23 Sep 61, App I, 4.

11. (TS) DPM, "Strategic Retaliatory Forces," 21 Nov 62, pp 6-7.

12. (TS) Ibid, p 10.

13. (TS) DPM, 23 Sep 61, App I, 9-10. Indications of percentages may be found in "History of the Joint Strategic Target Planning Staff Revisions 1-8 to SIOP-64," Hqtrs, SAC, Jan 67, p 25, App, Attach 2. (Hereafter referred to as SIOP History).

14. (TS) SIOP-63 History, pp 15-16.

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15. (U) U.S. Cong, House, Committee on Armed Services, Hearings, Military Posture and H.R. 4016...., 89th Cong, 1st sess, 1965, p 172.

16. (U) U.S. Cong, House, Committee on Armed Services, Hearings, Military Posture..., 88th Cong, 1st sess, 1963, pp 308-309; U.S. Cong, House, Committee on Armed Services, Hearings, Military Posture, 88th Cong, 2nd sess, 1964, pp 6929-30.

17. (S) USAF Statistical Digest, FY 1962, p 14; ibid, FY 1963, pp 13-14. Slightly different figures are in (U) Hqtrs, SAC, "Development of Strategic Air Command, 1946-1976," 21 Mar 76, pp 88-97.

18. (U) Hqtrs, ARDC, "History of ARDC," 1959, Vol II, "The B-70 Story: Evolution of Weapon System 110A," pp 5-6.

19. (U) Ibid, pp 100ff.

20. (S) "The B-70 Program" (paper prepared for the Secretary of Defense), 12 Mar 1962.

21. (U) Ibid, attach, "B-70 Bomber Budget Chronology"; (U) Public Papers of the Presidents, John F. Kennedy, 1961, pp 238-39; DoD press release No. 1220-61, 27 Oct 61.

22. Enthoven and Smith, pp 243-51.

23. SecDef statement on the RS-70, DoD press release, 15 Mar 62, pp 2-5.

24. Ibid, pp 4-5.

25. Ibid, attachment listing funding.

26. U.S. Cong, House, Committee on Armed Services, Report on No. 1406 (to accompany H.R. 9751), 87th Cong, 2nd sess, 1962, p 1.

27. Ibid, p 9.

28. SecDef statement, DoD press release, 15 Mar 62.

29. Congressional Record, 21 Mar 62 Vol 108, Pt 4, 4694-4720; Washington Post, 22 Mar 62.

30. Letter, President Kennedy to Rep. Carl Vinson, 20 Mar 62, in Congressional Record, 21 Mar 62, Vol 108, Pt 4, pp 4309-10.

31. This account of SKYBOLT except where otherwise noted, is based on (U) Enthoven and Smith, pp 251-62, and on the (S) SKYBOLT study prepared for President Kennedy by Richard Neustadt. See also Richard Neustadt, Alliance Politics (New York, 1970).

32. (S) Memo, SecDef for Dir, DR&E, 1 Feb 61.

33. (S) Neustadt, SKYBOLT study.

34. (S) Ibid.

35. Details of the proposed NIKE-ZEUS system and OSD's evaluation of its utility are presented in (TS) DPM, 30 Sep 61, App II, 5, 12-14.

36. (TS) Ibid, pp 7-8.

37. (TS) Ibid, pp 3, 7, 12-14.

38. Ibid, p 5; U.S. Cong, Senate, Committee on Armed Services, Hearings, Department of Defense Appropriations for 1962, 87th Cong, 1st sess, 1961, pp 22-24.

39. (TS) DPM, 30 Sep 61, App II, 11-12.

40. U.S. Cong, House, Subcommittee of the Committee on Appropriations, Hearings, Department of Defense Appropriations for 1963, 87th Cong, 2nd sess, 1962, Pt 2, 81.

41. (TS) DPM, "Ballistic Missile Defense," 20 Nov 62, p 2.

42. (TS) Ibid, p 7.

43. (TS) Ibid, pp 15-26; (S) Posture Statement, 19 Feb 63, pp 60-61.

44. (S) Memorandum to List, Roswell L. Gilpatric, Deputy Secretary of Defense, 12 Mar 64. For a list of the studies prepared in response to this directive, see (U) DDR&E "A Summary Study of Strategic Offensive and Defensive Forces of the U.S. and USSR," 8 Sep 64.

45. (U) These summary numbers are derived from the chart on p 120 of DDR&E "Summary Study."

46. (TS) Hqtrs, USAF, "Air Force Project Blue Lance--Interrelationship Between Strategic Offensive and Defensive Forces," 15 Dec 65, pp 205-210.

47. (TS) Ibid, pp 199-212.

48. (S) Interview with Kent, 28 Jul 75.

49. (S) Memo, SecDef for President, sub: Production and Deployment of the Nike-X, 17 Jan 67, pp 9, 24. The specific estimate of the lethal radius of the warhead was provided by the Office of the Director of Defense Research and Engineering in a supporting memorandum dated 18 November 1966, p 4.

50. (S) Draft memo, OAD/DS/DDR&E, Ballistic Missile Defense 1966, 16 Nov 66, pp 21-24, 26-28.

51. For details of the Soviet system discussed below, except where otherwise noted, see (S) DIA, "Soviet Union ABM Defenses," ST-CS-15-7-67-INT, Dec 67; (S) DIA,"The Moscow ABM System," ST-CS-15-01-69, Jun 69; (S) DIA, "SA-5 Defensive Missile Systems," ST-CS-14-05-69, 16 Jan 70.

52. (TS) NIE-11-3-66, 17 Nov 66.

53. (U) Morton Halperin, "The Decision to Deploy the ABM: Bureaucratic and Domestic Politics in the Johnson Administration," World Politics, Vol 25 (1972), pp 62-95; Edward R. Jayne II, "The ABM Debate: Strategic Defense and National Security," Ph.D. dissertation, Massachusetts Institute of Technology, 1969.

54. (S) Memo, SecDef for President, sub: Production and Deployment of the Nike-X, 17 Jan 67.

55. (S) Ibid, pp 18-21.

56. (S) Ibid, p 28.

57. (S) Ibid, p 22

58. (U) Morton Halperin,"ABM,"records the imposition of this deadline, which appears to have been done informally.

59. (U) Lyndon B. Johnson, The Vantage Point (New York, 1971), pp 479-485.

60. (U) DoD press release No. 868-67, 18 Sep 67, pp 21-24.

61. (U) Ibid.

62. (S) Nalty, pp. 7, 17. (S) Lulejian, "U.S. Submarines," Pt 3, 22-35.

63. (S) USAF, "Competition," Vol 1, 322-23; (TS) Nalty, pp 4-7.

64. (TS) Nalty, pp 1-6; (S) Lulejian, "U.S. Submarines," Pt 3, 33-35.

65. (S) This study is cited in (S) "Penetration Aids Program for U.S. Strategic Missiles," n.d. but probably prepared by DDR&E in late 1962 or early 1963, in SecDef FY 1964 Back-up Book, Vol II, Item G, 1.

66. (S) Ibid, pp 1-2.

67. (U) Ted Greenwood, Making of MIRV: A Study of Defense Decision-Making (Cambridge, Mass., 1975) pp 28-37.

68. (U) Ibid, pp 37-39.

69. (U) Ibid, pp 7-9, 43-46.

70. (U) Ibid, pp 4-9, 59-63.

71. (TS) DPM, 12 Nov 63, pp 3-4.

72. (TS) Draft memo, SecDef for President, sub: Recommended FY 1966-1970 Programs for Strategic Offensive Forces, Continental Air and Missile Defense Forces, and Civil Defense, 3 Dec 64, pp 14-17, 29-31.

73. (TS) Ibid, pp 46-47, 68.

74. (TS) Ibid, p 48,52; (U) DDR&E, "Summary," p 186.

75. (S) Posture Statement, 7 Feb 66, pp 81-83; (S) Posture Statement, 23 Jan 67, pp 72-73.

76. (S) Posture Statement, 23 Jan 67, pp 46, 72-74; (S) Posture Statement, 16 Feb 68, pp 58, 81-82, 83-84; (TS/RD) SIOP-4, Revision B and C History, p 24; Greenwood, pp 42, 59-62, 100.

77. (U) Greenwood, p 39.

78. (TS) USAF, "Blue Lance," pp 44, 206.

79. (TS) DPM, FY 1967-71 Strategic Offensive and Defensive Forces, 1 Nov 65, p 28.

80. (TS/RD) SIOP-62 History, pp 26-29; (S) interview with Miller, 2 Jul 75, pp 3-4.

81. (S) Memo, Meeting with President to Review the Defense Budget, 21 Feb 61.

82. (TS) Notes, SecDef, Berlin Military Planning, 6 Jul 61.

83. (TS) Memo, SecDef for President, sub: "Command and Control Task Force," 24 Aug 61.

84. (TS) Letter, SecDef to President, 7 Oct 61; (TS) OSD, Final Report of the National Command and Control Task Force, 14 Nov 61, Pt I, Tab E; (TS) Memo, Gen E.E. Partridge for SecDef, 5 Oct 61.

85. (S) OP-973B/kb (draft), Memo for the Record, "Positive Command and Control System for Fleet Ballistic Missile, meeting on," n.s., 19 Jul 67.

86. (TS) SIOP-63 History, pp 15-17.

87. (TS) Ibid, pp 28-29.

88. (S) Interview with Lt. Col. Don Anderson, by A. Goldberg et al, 5 Sep 1975.

89. (S) Memo, SecNavy John B. Connally to SecDef, 3 Feb 61.

90. (TS/RD) SIOP-62 History, P 26.

91. (TS) Memo, Chm, JCS, for SecDef, "Guidance for the Preparation of SIOP-63," CM-332-61, 8 Aug 61; memo, Chm, JCS, for SecDef, "Guidance for Preparation of SIOP-63," JCSM 605-61, 1 Sep 61.

92. (TS) SIOP-63 History, pp 3-9.

93. (TS/RD) SIOP-4, Revision D and E History, p 3; (TS/RD) SIOP, Revision J and K History, App F.

94. (TS) Memo, Henry S. Rowen, DASD(ISA), for SecDef, "Comments on JCS Guidance for Preparation of SIOP-63," 1-18, 891/61, 21 Aug 63.

95. (TS) SIOP-63 History, pp 14-16.

96. (TS) SIOP-64, Revision 1-8 History, pp 13-18.

97. (TS) Ibid, p 5; (TS/RD) SIOP-4 and Revision A, p 8.

98. (TS) SIOP-64, Revisions 1-8 History, p 14.

99. (TS/RD) SIOP-4, Revision D and E History, p 11; (TS/RD) SIOP-4, Revision B and C History, pp 2-3.

100. (TS/RD) SIOP-4, Revision D and E History, p 11, 30.

101. (TS) PONAST I Report, JCSM-156-69, 20 Mar 69; (TS) PONAST II Report, JCSM 375-13, 22 Aug 73.

102. (TS/RD) SIOP-4, Revision B and C History, pp 12-26.

103. (TS) Wainstein et al, "The Evolution of U.S. Strategic Command and Control and Warning, 1945-1972," Study S-467, Institute for Defense Analyses, Jun 75 (hereafter referred to as IDA Study S-467).

104. (TS) WSEG Report No. 159, Vol I, i-iii, 8-9, Vol IX, 5-9, 15-29, Feb 71; (TS) Report, Blue Ribbon Defense Panel to President and SecDef, 1 Jul 70, App on National Command and Control Capabilities and Defense Intelligence.

105. (TS) WSEG Report No. 159, Vol I, 63-64; (TS) IDA Study S-467, pp 423-25.

106. (TS) WSEG Report No. 159, Vol I, 56, 64-65, Vol IX, Pt 2, 47-48, 298-99.

107. (TS) Ibid, Vol I, 66, Vol IX, Pt 2, 8-9, 275-88, 448ff.

108. (TS) IDA Study S-467, pp 176-77, 324-27, 386-88.

109. (TS) "The JCS Single Integrated Operational Plan (SIOP-4) Decision Handbook," Edition F, revised 1 Jul 70, in WSEG Report, Vol IX, Pt 2, 255.

110. This section is based on interviews.

111. For details of the Cuban crisis see Allison, pp 102-143; Robert F. Kennedy, Thirteen Days (New York, 1969); Abel, The Missile Crisis.

112. SAC Historical Study No. 90, "Strategic Air Command Operations in the Cuban Crisis of 1962," Mar 64, Vol I, 33-35.

113. Abel, pp 153-56; Kennedy, pp 70-74. Allison pp 127-32.

114. Allison, p 138.

CHAPTER XII

NOTES

1. (U) U.S. Cong, Senate, Committee on Armed Services, Military Procurement Authorizations for Fiscal Year 1966, Hearings, 89th Cong, 1st sess, 1965, pp 44-55.

2. (U) Letter to Chairman Khrushchev on the Eve of the Reopening of the Geneva Disarmament Conference, 20 Jan 64, Public Papers of Lyndon B. Johnson, 1963-64, Vol I, 153-55; Message to the 18-Nation Disarmament Conference in Geneva, 21 Jan 64, ibid, pp 171-72.

3. For an example of an intelligence projection presented to Congress, see (U) McNamara statement in U.S. Congress, Senate, Committee on Armed Services, Military Procurement Authorization for Fiscal Year 1965, Hearings, 88th Cong, 2d sess, 1964, pp 28-41.

4. Documentary references for much of the material which follows are contained in a special annex.

5. (S) DIA, SS-11 Ballistic Missile System, ST-CS-13-005-73, Apr 73.

6. (S) DIA, SA-5 Missile System, ST-CS-11-306-73, Dec 73.

7. (S) DIA, SS-9 Ballistic Missile System, ST-CS-10-09B-74, Oct 74, pp ix-x.

8. (S) DIA, SS-11 ICBM System, DST-1010S-314-78, Feb 79, p 18.

9. (S) DIA, SS-N-6 Ballistic Missile System, ST-CS-10-415-75, Nov 74; DIA, SS-N-8 SLBM System, DST-1020S-416-75, Dec 75.

10. (U) Khrushchev Remembers, Vol II, 48-49.

11. (U) Ulam, Chap 11.

12. (U) See, for example, Tatu, p 122, and Linden, pp 90-91.

13. (U) Tatu, pp 79-91, provides a basic well-documented description of the events discussed here and below.

14. (U) Cited in ibid, p 215.

15. (S) DIA, SS-9 Ballistic Missile System, Oct 74, p 17.

16. (S) DIA, SS-18 ICBM System, DST-1010S-341-76, Mar 76.

17. (S) DIA, SS-17 ICBM System, DST-1010S-305-76, Mar 76; (S) SS-18 ICBM System, DST-1010S-366-75, Dec 75; (S) DIA, SS-19 ICBM System, DST-1010S-366-79, Nov 79.

CHAPTER XIII

NOTES

1. (U) John Newhouse, Cold Dawn (New York, 1973) provides an account of the development of the SALT agreement aided by substantial cooperation from well-informed government officials. The basic provisions of the agreement and some details of the negotiation process are reported in that book.

2. (U) Public Papers of President Lyndon B. Johnson, 1963-64, Letter to Chairman Khrushchev on Eve of Reopening of the Geneva Disarmament Conference 20 Jan 64, pp 153-55; Message to the 18-Nation Disarmament Conference in Geneva, 21 Jan 64, pp 171-72.

3. (S) Two documents on file in the Lyndon Baines Johnson Library -- Pen Pal Exchanges on Disarmament, Arms Control, and Strategic Weapons, 30 Jun 68 and Arms Control Messages Exchanged between President Johnson and Chairman, USSR, Jun 68 -- summarize this correspondence.

4. (S) Memo of conv, Rusk and Gromyko, 9 Dec 64, in National Security files: USSR, LBJ Library, (C) memo of conv, Johnson and Gromyko, ibid.

5. (S) Memo of conv between Harriman and Kosygin, 21 Jul 65; (S) memo of conv between L. Thompson and Dobrynin, 9 Feb 65.

6. This initiative was supported by conversations in December 1966 and January 1967 between the Soviet Ambassador to the United States, A. Dobrynin, and various U.S. officials. See (TS) cables, State 121549 and 123253, Dept State to Amer Emb, Moscow, 19 and 22 Jan 67.

7. (TS) Cable, State 118864, Dept State to Amer Emb, Moscow, 14 Jan 67.

8. (TS) Cable, State 123182, Dept State to Amer Emb, Moscow, 21 Jan 67; cable Dept State to Amer Emb, Moscow, 5 Sep 67.

9. (S) Paul H. Nitze, memo of conv, 12 May 72.

10. (U) U.S. Cong, Senate, Committee on Foreign Relations, Strategic Arms Limitation Agreements, Hearings, 92d Cong, 2nd sess, 1972, p 399.

11. Detailed references concerning the fourth generation missile testing programs are provided in a special annex.

12. (S) Kosygin's views, including the phrases represented as direct quotes here and below, were summarized by Seymour Weiss of the U.S State Department, who read the British record of discussion and summarized it in a Memorandum of Conversation dated February 27, 1967.

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History of the Strategic Arms Competition, 1945-1972

List of Supporting Studies for History of the Strategic Arms Competition, 1945-1972

Office of the Secretary of Defense

Historical Office

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Vol. III - Chronology - U.S.S.R., 1945-1972

(U) Jack M. Shick, Organization of the United States Navy, 1940-1950, March 1975

(C) Dean Stevens, Organization of the United States Army, 1946-1952, March 1975

(U) Samuel A. Tucker, Organizing for National Security, 1945-1952, September 1975

(U) Samuel F. Wells, Jr., Sounding the Tocsin: NSC 68, 1975

(TS/RD) Samuel R. Williamson, Jr., and Steven L. Rearden, The View from Above: High-Level Decisions and the Soviet-American Strategic Arms Competition, 1945-50, October 1975

(TS) Herman S. Wolk, USAF Organization for Strategic Warfare, 1948-1968, July 1975

(TS/RD) _____, Organization of the United States Air Force, 1945-1952, March 1975

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(U) Defense Budget and FYDP Breakdown Since FY 1945, 24 July 1975

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(TS) Final Technical Report, Book I, History of Strategic Air & Ballistic Missile Defense 1945-1972, 25 September 1975

(TS) Final Technical Report, Book II, History of Strategic Air & Ballistic Missile Defense 1945-1972, 25 September 1975

(TS) Final Technical Report, Book III, History of Strategic Air & Ballistic Missile Defense 1945-1972, 25 September 1975

(U) Executive Summary, 25 September 1975

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(U) U.S. Aircraft Carriers In the Strategic Role, Part I--The Development of a Nuclear Attack Capability (1945-1951), October 1975

(TS) U.S. Aircraft Carriers In the Strategic Role, Part II--Refining the Nuclear Attack Capability and Adapting It to a Mission (1952-1962), October 1975

(S) U.S. Aircraft Carriers In the Strategic Role, Part III--The Decade of the SIOP (1962-1972), October 1975

(S) U.S. Strategic Missile Submarines, Part I--The Years of Experimentation (1945-1953), October 1975

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(S) U.S. Strategic Missile Submarines, Part III--The Ascendancy of Submarine-Launched Ballistic Missiles (1955-1972), June 1975

(S) Soviet Strategic Missile Submarines, Part I--The Pre-Nuclear Stalin Period (1945-1955), October 1975

(S) Soviet Strategic Missile Submarines, Parts II & III--The Emerging Soviet Navy and YANKEE (1955-1972), Vol I (Text), October 1975

(S) Soviet Strategic Missile Submarines, Parts II & III--The Emerging Soviet Navy and YANKEE (1955-1972), Vol II (Appendices), October 1975

(S) Addenda to Chronology of Strategic Arms Competition, United States (1945-1972), July 1975

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