Perspectives on Strategic Defense

Edited by

Steven W. Guerrier and Wayne C. Thompson

Foreword by Zbigniew Brzezinski

Perspectives on Strategic Defense

About the Book and Editors

Bringing together proponents and opponents of the Strategic Defense Initiative, this book includes original essays by leading experts on every aspect of the issue. The collection provides a valuable introduction to the many complex questions involved in any serious consideration of the SDI. The contributors explore such issues as the strategic implications of the SDI, the technical feasibility of the proposal, its impact on U.S.-USSR relations and the arms control process, and the response of NATO allies to the program.

The book also includes a detailed history of the strategic defense debate, policy statements by the key political players, and petitions on its technical flaws and arms control implications that have been signed by U.S. scientists. A comprehensive glossary and index make this book a valuable reference tool.

Steven W. Guerrier is assistant professor of military and diplomatic history at the Virginia Military Institute. **Wayne C. Thompson** is associate professor of political science at the Virginia Military Institute and specializes in European politics.

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To
Nancy and Susie

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Foreword

Zbigniew Brzezinski

Four years have passed since President Reagan launched the Strategic Defense Initiative. The resulting debate has afforded us a unique opportunity. The United States is on the verge of a fundamental development in strategic weapons technology. In the past, technological development in the area of strategic weapons ran ahead of our ability to assimilate their implications for national strategy. The invention of nuclear weapons in the forties preceded serious discussion of the impact of nuclear weaponry on war and peace. For the next two decades, we engaged in a continuous debate about the role of nuclear weapons in our national strategy. Leaving aside for the moment the desirability of the subsequent development and deployment of a strategic defense, we are in a position that gives us the opportunity to engage in a kind of strategic re-evaluation, re-thinking, and redevelopment of our strategic doctrine that would make whatever decisions we eventually make about the SDI part of a coherent long-range strategy.

It is my view that the Strategic Defense Initiative provides the United States with the means of achieving mutual strategic security, either through a bilateral arms control agreement with the Soviet Union or through a unilateral deployment of a limited strategic defense. Our willingness to explore the possibility of building a strategic defense creates enormous leverage to induce the Soviets to accept in negotiations significant cuts in offensive nuclear forces, particularly those that are accurate and powerful enough to destroy hardened targets in a first strike. It is imperative that the United States continue with a vigorous research and development program for its negotiating position to appear credible. This program should be directed toward those defensive systems that can be developed in the near term to defend our retaliatory forces and command system. At the same time, this view implies that the United States must be willing *both* to limit the scope of its strategic defenses as part of an agreement and to take soon the initial deployment decisions in favor of a two-tier limited strategic defense system. Thus, if the negotiations succeed or fail to reach a stabilizing agreement, our strategic retaliatory forces will be more secure.

In this volume, Professors Steven Guerrier and Wayne Thompson have made a valuable contribution to the debate over strategic defense. Based on

conferences at the Virginia Military Institute in the spring and fall of 1986, this book includes important insights on the SDI issue from prominent figures on both sides of the debate, as well as a transcript of a lengthy discussion session among these experts and a section that reproduces several official government policy statements. This debate, of course, will not end here, but our understanding of the fundamental issues involved with the SDI will surely be enhanced.

Preface

The debate over the Strategic Defense Initiative touches on the very survival of our nation and of mankind. How can we best be protected from atomic annihilation? Through defensive weapons, mutual vulnerability to offensive nuclear weapons, negotiated arms reductions, or some combination of these?

In a speech before the House of Commons on March 1, 1955, Winston S. Churchill said in reference to the policy of nuclear deterrence: "It may well be that we shall by a process of supreme irony have reached a stage in this story where safety will be the sturdy child of terror, and survival the twin brother of anihilation." Over four decades, nuclear deterrence has been the basis for keeping peace in the atomic age. Both sides have maintained swords, but no real shields. Is this approach now outdated? Is it time to attempt to render the nuclear threat impotent and obsolete by technical means? Would SDI undermine or strengthen the deterrence of war?

The Corps of Cadets at the Virginia Military Institute considered these questions to be so important that on April 7–8 and October 16–17, 1986, it organized two symposia on the subjects of SDI and the use of outer space. The participants, who represented widely divergent points of view, discussed the key elements of the debate over SDI: what it is and why it was proposed; its technical and financial feasibility; the response to it by the Soviet Union and America's allies; its impact on the United States's strategic doctrine and on arms control negotiations; and whether, in sum, SDI brings us hope or danger, stability or instability, peace or war. The presentations and discussions at those conferences provide the backbone of this book.

Part One of this volume is almost entirely composed of original and previously unpublished writings on SDI. Where a piece is an edited transcript of a speech presented at VMI, it is so noted. Most authors submitted papers which were used for this book. Part Two consists of important public pronouncements on strategic defense by American and non-American governmental leaders. These official statements have been the primary sources for the present public discussions concerning SDI. This part also

contains critical opinions on SDI articulated by American and Soviet scientists. Finally, Part Two includes the text of the Anti-Ballistic Missile Treaty of 1972, which most participants in the public debate cite, but which far fewer have ever read.

The editors of this book wish to thank the Virginia Military Institute—particularly General Sam S. Walker, Superintendent; Brigadier General John W. Knapp, Dean of the Faculty; Colonel Leroy D. Hammond, Executive Assistant to the Superintendent; and Dr. Patrick M. Mayerchak, Senior Director of the VMI International Studies Program—for their total support of the symposia and for their encouragement to seek out spokesmen from all points of view. We wish to thank Dr. Willard M. Hays, Chairman of the Department of History and Politics, for generously providing the cadet staff with indispensable facilities and services and for tolerating our preoccupation with this project.

We are grateful to the VMI Foundation and the International Studies Program for a grant to support this publication. Dr. Edward J. DeLong, Audiovisual Librarian at VMI, provided crucial technical advice and assistance in taping the sessions and in producing the transcripts used by some of the authors. Cadets James Bradford Adams, Scott R. Harbula, Paul F. Hicks, Jr., Douglas M. Jacobsen, Michael R. Laban, Nicolas J. Lovelace, David J. Furness, Michael E. McGraw, A. B. Miller, and Mark A. Snedecor worked prodigiously and imaginatively to make the two symposia work; they have more than earned our gratitude and congratulations.

Professor T. Y. Greet and the VMI Symposium Committee gave us the benefit of their experience and guidance and prevented us from having to reinvent the wheel in planning our conferences. Mr. Richard McCormack of NASA was extremely generous with his time and contacts; much of the responsibility for the success of our second conference falls on his shoulders. Dr. Larry I. Bland, Marshall Papers Editor at the George C. Marshall Foundation, took the papers and documents gathered by two inexperienced editors and helped to transform those pieces into this book. Our appreciation for his part in this work matches the great extent to which we depended upon his meticulous efforts and professional experience.

We thank the BDM Corporation, which helped us bring a few of this book's authors to VMI. Of course, we thank the authors themselves whose ideas and arguments are the substance of this work. We can hardly express adequately our immense appreciation to Colonel Joseph M. Rougeau of the United States Air Force, who not only opened many doors for us, but who, more importantly, prodded and persuaded us to "think big." Finally, we owe very special gratitude to the VMI Corps of Cadets, without whose interest and initiative, this project would never have taken shape.

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PART ONE

1

Looking Back: Strategic Defense and US National Security

Steven W. Guerrier

TO many Americans, the search for an effective means of defense against the threat of nuclear war began with President Ronald Reagan's speech to the nation of March 23, 1983. In this address, the president called upon the American scientific community to "give us the means of rendering these nuclear weapons impotent and obsolete."[1]

The wisdom and feasibility of President Reagan's objective notwithstanding, his appeal serves as a dramatic illustration of the power of the presidency to shape the debate over issues of national and international importance. Over the next few months, as the organization to pursue the Strategic Defense Initiative (SDI) took form, it became clear that the framework for discussion of strategic nuclear weapons and their role in US national security policy had been significantly altered. Ballistic Missile Defense (BMD) quickly became the focal point of a great debate over nuclear strategy. All related issues took on a secondary status as SDI became the principal issue in the domestic debate over national defense—and the major obstacle to the conclusion of an arms control agreement with the Soviets.

The Strategic Defense Initiative has been billed as a "new vision," by which American technology would be harnessed to the search for a means to provide the United States with an effective defense against enemy attack. However, while the technology may be new, the "vision" is as old as the nation itself, and its fulfillment has been sought on many previous occasions. The present debate can be viewed as the latest episode in this long search for the best means of providing for the physical security of the United States.

1. Ronald Reagan, "Defense Spending and Defensive Technology," televised speech delivered March 23, 1983, "Weekly Compilation of Presidential Documents," March 28, 1983, pp. 423-66.

Traditional Approaches to Strategic Defense

The problem of strategic defense—that is the defense of the national homeland—is one that has, by definition, faced the United States since the beginning of the republic. Then, as now, the object has been to prevent the employment of an enemy nation's military capabilities directly against the territory of the United States, its population, and its productive resources. Throughout most of American history this has involved efforts aimed primarily at preventing adversaries from launching naval or amphibious attacks against the coasts and at establishing defense against cross-border invasions.[2]

During the nineteenth century, such defenses consisted primarily of fortifications, coastal batteries, and a navy that was in varying degrees capable of denying an enemy access to American waters. For most of the century, however, these were relatively low priority items. Except in times of crisis, appropriations were lacking and technological advances were haphazard at best. New approaches to strategic defenses were commonly the result of efforts to reduce defense expenditures and were rarely successful. President Thomas Jefferson's gunboats and the later use of ironclad monitors as harbor batteries are among the more entertaining examples. Overall, it was assumed that there would be sufficient time to mobilize to meet any threat that might jeopardize American security.

However, the American approach to strategic defense in the nineteenth century was not as unrealistic as this apparent lack of attention might indicate. After the War of 1812, foreign threats to the territory of the United States were minimal. Diplomatic efforts, such as the Rush-Bagot Agreement of 1817, led to the ultimate demilitarization of the border with Canada. The army was generally able to cope with the declining Spanish presence on the continent and with whatever threat might be posed by Mexico. Most importantly, after 1814 the growing commonality of interests between the United States and Great Britain—the world's greatest naval power—insured that the Atlantic would remain far more a defensive moat than a potential avenue of invasion. In any case, the American abstention from active involvement in world affairs during this period greatly lessened the chances of serious conflict.

By the end of the nineteenth century, with the United States assuming the role of a major power, the expanding navy became the true first line of defense for the homeland, as well as for the new American interests over-

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2. General accounts of the traditional American approach to the problems of strategic defense can be found in such works as Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Macmillan, 1972), and Allan R. Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America* (The Free Press, 1984).

seas. Coastal and border fortifications grew irrelevant and were dismantled or converted into historic sites. The naval capabilities of the United States were believed to provide effective security against the threat of direct attack and would continue to give the nation time to mobilize in the event of a major conflict. As long as any attack on the American continent would necessarily come by sea, this would be adequate.

The rise of air power in the twentieth century, however, would change the fundamental assumptions upon which the American approach to strategic defense were based, albeit slowly.[3] During World War I, air power was primarily applied at a tactical level related to the battlefield situation below. The few strategic bombing raids against population and economic targets had little impact on the war or on military planning in the years that followed. Some authors, most notably Giulio Douhet, did argue that strategic bombing would render all other forms of military power obsolete, but most interwar efforts to translate such theory into policy met only resistance from military leaders.[4] In the United States, the foremost supporter of air power was Colonel Billy Mitchell, whose persistent advocacy and criticism of American inattention to the subject led to his court-martial in 1925. Only in the mid-1930s did the potential of air power, at both the tactical and strategic levels, begin to receive the serious consideration of military planners outside of the air services.

The experience of World War II removed all doubt that strategic air power would be an important part of any nation's military capability. It demonstrated that success in modern war would increasingly come to depend on an ability to strike at the industrial base which supplied the forces of the enemy. The Allied bombing campaigns against Germany and Japan, in particular, showed that this new weapon could provide that ability. Furthermore, there was continued hope that the bombing of population centers would demoralize an enemy and bring about its collapse. Postwar analyses of strategic bombing might challenge those advocates who argued that such campaigns alone would win future wars, but it was clear that strategic air power—and defense against it—would be important components of national security in the future.[5] For the United States, this meant that the traditional seaborne approach to strategic defense would soon be insufficient.

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3. See Robin Higham, *Air Power: A Concise History* (St. Martin's Press, 1972), pp. 25–72. See also Trevor N. Dupuy, *The Evolution of Weapons and Warfare* (Jane's, 1982), pp. 240–44, and Weigley, *American Way of War*, pp. 223–41.

4. Giulio Douhet, *The Command of the Air* (Office of Air Force History, 1983). See also I. B. Holley, Jr., *Ideas and Weapons* (Office of Air Force History, 1983).

5. For example see Millett and Maslowski, *Common Defense*, pp. 435–40. See also United States Strategic Bombing Survey, *Summary Reports* (GPO, 1945–46).

Long-range bombers were not, however, the only new threat to be considered. The German development of the V-1 flying bomb—essentially a pilotless aircraft laden with high explosives—and, especially, the V-2 rocket were even more ominous. After all, the principles of defense against manned bombers were well understood. The development of radar, proximity fuzes, and jet aircraft offered the hope that strategic bombing compaigns might be defeated by attrition before they could have a decisive impact on the defender's capability and will to make war. The Battle of Britain, for example, demonstrated that an attrition rate of 10 percent was enough to force the abandonment of such a campaign by the Germans. But guided missiles were potentially far more challenging. They travelled too fast and flew too high to be intercepted reliably by a conventional antiaircraft defense. Also, they carried no crewmen who might be deterred by the prospect of flying into heavy fire.

Fortunately for the Allies, the weapons employed by the Germans during the war were relatively unreliable and inaccurate. The V-1 could deliver a ton of high explosive to a range of roughly two hundred miles, but it was only accurate to within about five miles of its target. Furthermore, with an average speed of only 350 miles per hour and an inability to take evasive action, it was highly vulnerable to a determined defense. Within three months of the initial use of V-1, the British were able to destroy over 80 percent of the flying bombs launched against them. While its speed and altitude made interception virtually impossible, the V-2 was not much more accurate than its predecessor. These rockets could deliver a slightly smaller warhead to within four miles of the intended target at a range of some two hundred miles. In any case, they were employed too late in the conflict to have a serious effect on the outcome.[6]

The potential of guided missiles, however, could not be ignored. As the war in Europe drew to a close, both the United States and the Soviet Union made determined efforts to capture as much as possible of the German rocket program and its personnel. The American effort, given the code name "Project Paperclip," was particularly successful. A number of German scientists, their files, and equipment (including three hundred railroad cars loaded with V-2 components) were soon on their way to the United States where they were integrated into the nascent American missile program at White Sands, New Mexico.[7] Although most experts believed that accurate missiles with a range greater than a few hundred miles were, at best, a decade away, it was clear that bombers would not be the only new challenge to strategic defense in the future.

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6. P. M. S. Blackett, *Fear, War, and the Bomb: Military and Political Consequences of Atomic Energy* (McGraw-Hill, 1948), pp. 51–53.

7. See Clarence G. Lasby, *Project Paperclip: German Scientists and the Cold War* (Atheneum, 1975).

And yet, if the bombers and missiles of the next war were limited to the delivery of high explosives, the problem of strategic defense might still be manageable. The experience of the war had demonstrated the difficulties associated with mounting an effective strategic bombing campaign employing conventional explosives: the number of sorties required to have a serious impact on a war economy was huge, the cost of penetrating a determined defense was high and the delivery of bombs was often inaccurate. The damage done was difficult to assess and was often quickly overcome. While missiles were much harder to intercept, problems associated with their range, accuracy, and payload capacity gave hope that their impact might be limited as well. The problem, of course, was that the bombers and missiles of the future would not be limited to the delivery of conventional explosives.

The development of the atomic bomb changed everything. The tremendous increase in destructive power that came with the new weapon meant that now one bomber or missile could now cause a level of devastation that previously might have required hundreds of delivery vehicles. It also meant that accuracy would be less of a problem for the attacker. Since the radius of destruction of an atomic weapon was so much greater than that of a conventional bomb, pinpoint accuracy—though still desirable—was far less critical.

The challenge to strategic defense was clear. Against a long-term conventional bombing campaign, the defender could hope to survive through the attrition of the attackers. But the most effective sustained air defenses yet mounted were not more than 10 to 15 percent efficient. Against campaigns involving the thousands of sorties required by conventional explosives, this might be enough to degrade the attack before it could inflict an unacceptable level of damage. With atomic weapons, however, the successful penetration of only a handful of bombers could be disastrous. Even a defense of 90 percent efficiency would likely not be enough, and there are, of course, no perfect defenses. Furthermore, the prospect that atomic weapons might some day be adapted to long-range guided missiles seemed to eliminate whatever hope might remain for an effective strategic defense in the future. The American monopoly on atomic weapons offered some comfort—as did problems associated with the weight of the bombs and the ability to produce them in quantity—but few experts believed that this situation would last, and fewer still found it an acceptable basis for national security in the postwar era.[8]

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8. Lawrence Freedman, *The Evolution of Nuclear Strategy* (St. Martin's Press, 1981), pp. 22–30.

Early Research into Missile-Based Defense

Attempts to deal with the new threats to the security of the United States were underway well before the end of World War II. Research continued in such areas as radar, antiaircraft artillery, fighter-interceptors, and other components of a conventional air defense. Additional programs sought to discover defensive applications of the same technologies which posed these new threats, but were generally accorded much lower priority than research into offensive weaponry. In part because of the apparent difficulty of creating an effective defense, the United States soon came to abide by the maxim that the best defense is the deterrent value of a good offense.

Although some academic strategists, such as Bernard Brodie, were arguing as early as 1946 that the only credible defense against atomic attack was through the creation of an effective deterrent force that would promise swift retaliation, the United States came to this policy mostly by default.[9] For three years following the war, the Truman administration gave surprisingly little attention to the implications of the atomic bomb for American policy. There was a general recognition that the new weapon was of great significance, but many in the administration resisted the notion that the atomic bomb had fundamentally altered the nature of warfare. Overall, it was thought that the next major war would be very much like the last. Atomic weapons would bring a new level of destruction, to be sure, but the basic outlines would remain the same.[10]

Only in 1948, during the Berlin crisis, did the president authorize the military to base its war plans on the assumption that atomic weapons would be used in a major conflict. Even then the decision was made for less than purely military reasons. With the wartime military demobilized and under

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9. Bernard Brodie, ed., *The Absolute Weapon: Atomic Power and World Order* (Harcourt, Brace and Company, 1946).

10. For an excellent account of the early history of American nuclear strategy, see David A. Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," *International Security* 7(Spring 1983): 3-71. See also Gregg Herken, *The Winning Weapon: The Atomic Bomb in the Cold War, 1945-1950* (Alfred A. Knopf, 1981); and Harry R. Borowski, *A Hollow Threat: Strategic Air Power and Containment Before Korea* (Greenwood Press, 1982). The decision to authorize plans for the use of nuclear weapons is contained in NSC-30, "United States Policy on Nuclear Weapons," September 10, 1948, reprinted in Thomas H. Etzold and John Lewis Gaddis, *Containment: Documents on American Policy and Strategy, 1945-50* (Columbia University Press, 1978), pp. 339-42. Discussion of particular war plans is found in Etzold and Gaddis, pp. 302-38; Anthony Cave Brown, *Dropshot: The American Plan for World War III Against Russia in 1957* (The Dial Press, 1978); and Kenneth W. Condit, *The History of the Joint Chiefs of Staff: The Joint Chiefs of Staff and National Policy*, vol. 2, *1947-1949* (Michael Glazier, Inc., 1979), pp. 283-310.

pressure to curtail defense spending, the Truman administration increasingly turned to the establishment of a strategic bombing force, armed with atomic weapons, as the most cost-effective form of striking power. It was hoped that such a force would be potent enough to deter Soviet aggression in the first place. If it were not, however, atomic weapons would at least allow the United States to deliver a serious blow to the Soviet war economy at the outset of a conflict.

Thus, while a policy based upon the threat of atomic retaliation is more commonly associated with the Eisenhower administration, its origins can be found during the period of the American monopoly prior to the end of 1949. The development of atomic weapons by the Soviet Union only served to harden a policy already in existence and to make the deterrence of war the principal mission of American strategic forces. Meanwhile, however, the search continued for a more effective means of providing for the defense of the United States.

As early as 1944, the Army had contracted for two research and development studies which would have a bearing on the future of strategic defense. The first of these, Project Hermes, was an investigation of the basic operational problems involved in a rocket program and was ultimately aimed toward the development of long-range surface-to-surface missiles. The contract was awarded to General Electric Corporation, which carried out a series of tests at the White Sands Proving Ground in cooperation with the Army Ordnance Department. Hermes took over from ORDCIT, an earlier effort by the Ordnance Department and the California Institute of Technology that had led to the development of a series of test-bed missiles known as Private A and Private F. Building on the success of the Private series, which involved some forty-one firings to a range of twelve miles, Hermes moved on to the development of a longer-range missile known as the WAC (Without Attitude Control) Corporal. Again, the purpose was experimental. The Corporal would eventually be deployed in a modified form as a tactical surface-to-surface missile, and its basic design would be incorporated into the Nike-Ajax series of air defense missiles.[11]

Project Hermes concluded with a series of over sixty firings of V-2 rockets assembled from components captured during the war. Most of these were conducted at White Sands between March 1946 and June 1951 and involved high altitude research as well as the study of military applications. Subsidiary programs, such as Operation Sandy, looked to more novel applications for guided missiles—in this case the firing of a V-2 from the deck of the aircraft carrier *Midway* in 1947.[12] By its close, Project Hermes

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11. For a discussion of Projects ORDCIT and Hermes, see Willy Ley, *Rockets, Missiles, and Men in Space* (Signet, 1969), pp. 284–94.
12. Ibid., pp. 291–93.

had produced a wealth of information that would provide the foundation for the subsequent development of rockets for both military and civilian use.

Although the most important in terms of basic research, Project Hermes was by no means the only program conducted in the early postwar era to have a bearing on prospects for an effective strategic defense. While Hermes was ultimately geared toward the development of offensive missiles, another Army program was begun in 1944 to focus on the defensive application of missile technology. Project Thumper involved basic research toward the development of a high altitude antiaircraft missile that would also be effective against rockets of the V-2 generation. The following year, Thumper would be merged with the Army Air Force's Ground-to-Air Pilotless-Aircraft program (GAPA) and then with a research program at the University of Michigan to become the Air Force's Project Wizard. This effort would ultimately lead to the two weapons with which the Air Force would contest the Army's claim for the mission of missile-based strategic defense—the Bomarc air defense missile and an antiballistic missile (ABM) program that would retain the code-name Wizard. Both, however, eventually lost out to the progeny of a third Army-funded research effort: Project Nike.[13]

Begun in February 1945, Project Nike was directed toward the actual production of a series of long-range surface-to-air missiles (SAMs) which could be employed against strategic bombers and, in later versions, against ballistic missiles. Development of the Nike series had, in fact, been initiated the previous year as a joint effort of Bell Telephone Laboratories and the Douglas Aircraft Company, under the direction of Western Electric as prime contractor for the Army. The establishment of the formal project reflected the growing potential accorded SAMs as a means of defense against strategic air attack.[14] This importance was enhanced by the results of a series of tests at the Army's Aberdeen Proving Ground, in 1947, which demonstrated that conventional antiaircraft artillery would be ineffective against jet aircraft.[15]

Building on the experience gained during the ongoing Project Hermes and employing the basic design of the WAC Corporal as a model, the Project Nike team completed work on a prototype by 1950.[16] Designated Nike-Ajax (MIM-3), the new weapon was a two-stage missile, with a range of twenty-five to thirty miles. Production was approved by the Truman administration, and the first units, armed with conventional warheads,

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13. Projects Thumper and Wizard are discussed in Ernest J. Yanarella, *The Missile Defense Controversy: Strategy, Technology, and Politics, 1955-1972* (University Press of Kentucky, 1977), pp. 27, 32-33.

14. On the early history of Project Nike, see ibid., pp. 27-28.

15. Dupuy, *Evolution of Weapons and Warfare*, pp. 270-71.

16. Ibid., p. 271.

became operational in 1953. By the end of the decade, Nike-Ajax batteries were located around some thirty potential target areas in the United States. Ultimately, some fifteen thousand missiles would be produced under the Nike-Ajax program, with large numbers being transferred to allied governments.[17]

Once the Nike-Ajax became operational, the project team concentrated on the development of a second generation air defense missile that would bring increased range and accuracy, as well as the capability of delivering nuclear warheads. This phase of the project was spurred on by intelligence reports indicating a growing Soviet strategic bombing capability and led to the production of the Nike-Hercules (MIM-14/A/B/C).[18] Entering service in 1958, Nike-Hercules had a range of ninety miles and could be armed with either a nuclear or conventional warhead. Greater readiness was achieved by providing solid fuel engines for both stages, unlike the Nike-Ajax which employed liquid fuel in its second stage. At its peak deployment in 1963, some 134 Nike-Hercules batteries would be in operation. Overall, more than twenty-five thousand Nike-Hercules missiles were produced by Western Electric in the United States and under license by Mitsubishi in Japan. Of these, roughly thirty-eight hundred were transferred to NATO and other allies. Nike-Hercules remained in service in the United States until 1974.[19]

Well before the Nike-Hercules became operational, however, it was clear that the threat posed by Soviet strategic bombers was considerably less than had been anticipated by the US intelligence community. It became apparent that the Soviets, rather than investing in manned bombers, were directing their greatest effort toward the development of long-range ballistic missiles.[20] In response, research into defensive technologies shifted from attempts to defeat strategic bombers to the far more difficult problem of coping with an attack by Soviet ICBMs.[21]

US Policy Toward Continental Defense, 1945–1960

While Project Nike offered the hope that an effective missile-based defense might someday be constructed, the new threats to American security would seem to have required more immediate attention. Yet, despite the implications of the development of atomic weapons and long-range bombers

17. For specifications on Nike-Ajax, see Tom Gervasi, *Arsenal of Democracy II* (The Grove Press, 1981), p. 224; and Ley, *Rockets, Missiles, and Men in Space*, p. 628.

18. Yanarella, *Missile Defense Controversy*, p. 28.

19. For specifications on Nike-Hercules, see Gervasi, *Arsenal of Democracy II*, p. 224; and Ley, *Rockets, Missiles, and Men in Space*, p. 628.

20. See John Prados, *The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength* (The Dial Press, 1982), pp. 45–50.

21. Yanarella, *Missile Defense Controversy*, p. 28.

for the defense of the United States, efforts to formulate a policy to deal with these threats were surprisingly slow in coming. Between 1945 and 1947, for example, there was little progress in the area of continental defense—as it was then called—beyond the revision of ABC-22, a US-Canadian plan drafted in 1941 for the joint defense of their coastal waters. In February 1947, this was superseded by the US-Canada Basic Security Plan. The new agreement listed the air defense of North America as the highest priority among eight "joint tasks," but little was done at the time to prepare for such a mission.[22]

There are several explanations for the apparently relaxed American attitude toward continental defense. In the first place, the pressure to dismantle the war-time military establishment and to cut defense spending greatly lessened the attractiveness of a program that would certainly be expensive. This reluctance increased as many government officials who were initially optimistic about the development of effective defenses came to understand the complexity of the problem.[23] Furthermore, there seemed to be no immediate threat to the security of the United States. Although it was widely acknowledged that the American monopoly of atomic weapons and the means to deliver them would not last, few expected that the Soviet Union would be capable of launching a major atomic attack until 1952 at the very earliest.[24] In any case, by the late 1940s, it was clear that the defense of the United States would indeed rest primarily on the development of a strategic nuclear force that would deter attack through the threat of certain retaliation.[25]

This is not to say that there was no recognition of the importance of continental defense. Administration officials frequently noted the need to meet any threat to the security of the United States and looked to the day when defensive systems would be deployed in strength. Air defense was listed among the highest priorities in every emergency war plan approved by the Joint Chiefs of Staff (JCS) since 1945, even when the means to carry out such plans were lacking.[26] Nevertheless, the administration continued to place almost exclusive emphasis on the development of offensive forces. By the fall of 1949, when the Soviets tested their first atomic bomb, active

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22. James F. Schnabel, *The History of the Joint Chiefs of Staff: The Joint Chiefs of Staff and National Policy*, vol. 1, *1945-1947* (Michael Glazier, Inc., 1979), pp. 380–89. See also Joseph T. Jockel, *The United States and Canadian Efforts at Continental Air Defense, 1945-1957*. Ph. D. dissertation, Johns Hopkins University, 1978.

23. Freedman, *Evolution of Nuclear Strategy*, p. 30. On postwar demobilization, see Schnabel, *History of the Joint Chiefs of Staff*, pp. 380–89.

24. For example see Condit, *History of the Joint Chiefs of Staff*, p. 536.

25. Rosenberg, "Origins of Overkill," pp. 14–20.

26. Condit, *History of the Joint Chiefs of Staff*, p. 536.

defenses of the United States were virtually nonexistent—twenty-three fighter squadrons and thirty antiaircraft artillery battalions were assigned to provide air defense for the entire continental United States and Alaska. This prompted General Hoyt S. Vandenberg, Air Force chief of staff, to remark that "almost any number of Soviet bombers could cross our borders and fly to most targets in the United States without a shot being fired at them."[27]

Even after the end of the American atomic monopoly, resources devoted to continental defense remained limited. A Soviet attack was still thought unlikely for at least several years, and deterrence was still considered the most effective approach to the problem. One change that did come in the wake of the Soviet test was a decision by the Joint Chiefs to proceed with the construction of a temporary network of early warning radars, known as LASHUP. By the outbreak of the Korean War in June 1950, this system consisted of forty-nine stations in the continental United States and Alaska.[28]

American involvement in Korea brought with it the approval of a massive increase in defense spending that had been urged in a National Security Council report (NSC-68) prepared in April 1950.[29] This led to the expansion of conventional, as well as nuclear, forces. Appropriations for continental defense were also increased.[30] By November 1952, forty-six fighter squadrons and forty-five antiaircraft battalions, supported by eighty large radars, were deployed for the defense of American airspace. Still, the actual deployments continued to fall short of the requirements of American war plans through most of the 1950s.[31] Funding increased, more interceptor aircraft were assigned, and missiles—such as Nike-Ajax and Nike-Hercules—replaced antiaircraft artillery, but the emphasis of American strategy continued to be placed on the deterrent value of offensive nuclear arms.

The Truman administration had come to the conclusion that nothing even approaching a "perfect" defense was possible in the foreseeable future. A Soviet attack might be degraded, but the destructiveness of atomic wea-

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27. Ibid., pp. 536–37.

28. Ibid., p. 541.

29. NSC-68, "United States Objectives and Programs for National Security," April 14, 1950, U.S. Department of State, *Foreign Relations of the United States, 1950,* vol. 1, *National Security Affairs; Foreign Economic Policy* (GPO, 1977), pp. 234–92. Series hereafter cited as *FRUS.*

30. For a discussion of the impact of NSC-68 on US defense programs, see Paul Y. Hammond, "NSC-68: Prologue to Rearmament," in Warner R. Schilling, Paul Y. Hammond, and Glenn H. Snyder, *Strategy, Politics, and Defense Budgets* (Columbia University Press, 1962), pp. 267–378. See also John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy* (Oxford University Press, 1982), pp. 89–126; Steven W. Guerrier, *NSC-68 and the Truman Rearmament, 1950–1953* (forthcoming).

31. "Status of National Security Programs of the United States in Relation to Approved Objectives," November 5, 1952, *FRUS, 1952–54,* vol. 2, part 1, *National Security Affairs* (GPO, 1984), p. 168.

pons would insure that those bombers which did get through would do very grave damage. More than ever, deterrence seemed the only effective option. In September 1952, Truman told the National Security Council that, as far as he could see, "there wasn't much of a defense in prospect except for a vigorous offense."[32] This emphasis on the deterrent value of offensive forces increased with the Eisenhower administration's "New Look" defense policy—which emphasized the cost-effectiveness of nuclear weapons—and its threats of massive retaliation for any Soviet aggression.[33]

Nevertheless, the evolving idea of reliance on a deterrence-based defense, with its implication that little could be done to stop a determined Soviet nuclear attack on the United States, was unattractive to a number of individuals involved in defense policy. In April 1948, the magazine *Atlantic* published an article co-authored by James R. Killian, president of the Massachusetts Institute of Technology (MIT). Entitled "For a Continental Defense," the article served as a rallying point for supporters of a more vigorous effort to develop an effective air defense.[34] Backed by Secretary of the Air Force Thomas K. Finletter, these officials were able to convince President Truman, in the spring of 1950, to authorize an intensive study of the problems of continental air defense. Known as Project Charles, the investigation was conducted by some twenty physicists at MIT over the next year.[35]

One result of Project Charles was clear even before the study began. This was to demonstrate the extent to which opposition to a major air defense program had developed within the Air Force. Sensing a threat to its offensive role, the Air Force made repeated efforts to have the study killed; only the continued support of Secretary Finletter kept it alive. The Air Force might accept continental defense as an adjunct to its deterrent mission, but it would fight any attempt to change American strategy to one that was defense-dominated. As one Charles participant recalled, "it was an uphill battle to get the Air Force to think about defense at all."[36]

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32. "Memorandum for the President of Discussion at the 122d Meeting of the National Security Council," ibid., p. 121.

33. Rosenberg, "Origins of Overkill," pp. 27-44. See also Glenn H. Snyder, "The New Look of 1953," in Schilling, Hammond, and Snyder, *Strategy, Politics, and Defense Budgets*, pp. 379-524; and Gaddis, *Strategies of Containment*, pp. 127-97.

34. James R. Killian and A. G. Hill, "For a Continental Defense," *Atlantic*, April 1948.

35. Gregg Herken, *Counsels of War* (Alfred A. Knopf, 1985), p. 61. Finletter had recently served as chairman of the President's Air Policy Commission, which called for the expansion of US strategic air power and air defense capabilities. See President's Air Policy Commission, *Survival in the Air Age* (GPO, 1948).

36. Herken, *Counsels of War*, p. 61.

In August 1951, the findings of the study were presented in a three-volume report, entitled "Problems of Air Defense." The report concluded that an effective continental defense was technically feasible and recommended that its development be undertaken immediately. It called for an increased number of fighters, rapid deployment of the Nike-Ajax, and increased funding for research on its successors. The report also called for the construction of a distant early warning radar network controlled by a system of computers, known as the Semi-Autonomous Ground Environment (SAGE), which was based on an MIT design for air traffic control.[37]

President Truman approved the study and soon authorized the establishment of a special research facility, the Lincoln Laboratory, at MIT to conduct further research on the problems of defense against bomber attack. Critics, however, quickly attacked the estimated two billion dollar cost of the Charles recommendations, and the Air Force charged that the report had grossly underestimated the difficulty of shooting down bombers. Of course, the Air Force by now had a considerable investment in bombers. It did not want their value called into question by discussions of how easily they might be destroyed.[38]

If the Air Force was unenthusiastic about continental defense, the same could not be said of the Army. The years since the end of World War II had been difficult for the Army. As American forces demobilized, it was the Army which suffered most from decreasing budgets. The National Security Act of 1947 had stripped it of the Army Air Force and, in establishing an independent United States Air Force, had created a powerful bureaucratic rival. The Key West and Newport Agreements, which assigned the services their basic roles and missions under the act, saw the Army bypassed as the principal strategic tasks were given to the Air Force and Navy. A major consequence of this was that, except during the Korean conflict, the Army's budget suffered well into the 1950s in comparison to its sister services. Therefore, in search of a lasting strategic mission, the Army increasingly came to place its hopes on continental defense.[39]

The Army's role in postwar strategic defense grew out of its responsibility for ground-based air defense during World War II. In the years after the war, the Army maintained antiaircraft artillery batteries for the point defense of a number of locations in the United States. But antiaircraft guns were of limited value against high-flying jet bombers. Therefore, as we have seen, the Army turned increasingly to research in missile technology. By the early 1950s, it was actively lobbying for operational control over missile-based continental defense programs.

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37. Massachusetts Institute of Technology, *Problems of Air Defense,* August 1951, cited in ibid., p. 63.

38. Ibid., pp. 63–64.

39. Yanarella, *Missile Defense Controversy,* pp. 28–29.

One aspect of the Project Charles report did find support in the Air Force, as well as elsewhere within the defense community. This was the continuing need for a permanent early warning radar network. Air Force interest was spurred on by a 1952 Rand Corporation study which exposed the extreme vulnerability of Strategic Air Command (SAC) bases—at home and overseas—to a Soviet preemptive attack.[40] An early warning network would allow more time for SAC to get its bombers off the ground and thus help protect the retaliatory force. By the end of 1952, this broad agreement on the need for an early warning radar system led Truman to approve NSC-139, which called for the joint development with Canada of a system that, by the end of 1955, could provide at least three hours warning of a Soviet bomber attack.[41]

During the Eisenhower administration attention to the problem of continental defense grew. A series of National Security Council studies examined the status of air defense programs, as did special commissions such as the Killian and Gaither panels. The conclusions were almost always the same: the current program was judged inadequate to meet the Soviet threat, and new increases were recommended. Over time, however, this did lead to the creation of a powerful air defense force.[42]

By the early 1960s, three radar networks—the Distant Early Warning (DEW), Mid-Canada, and Pine Tree lines—provided early warning. Active defense was provided by sixty-seven regular and fifty-five Air National Guard fighter-interceptor squadrons, supported by batteries of Nike-Hercules missiles and the new Hawk low-altitude SAM. The only problem was that by then it had long been clear that the Soviets had foresaken the development of a large bomber force and had turned their attention instead to ballistic missiles. Consequently, programmed deployments were not completed, and many of these forces were soon assigned to other missions.

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40. The SAC vulnerability study is discussed in Fred Kaplan, *The Wizards of Armageddon* (Simon and Schuster, 1983), pp. 101-10, 117-21.

41. NSC-139, "An Early Warning System," December 31, 1952, is discussed in "Memorandum by Paul H. Nitze and Carlton Savage of the Policy Planning Staff," *FRUS, 1952-1954,* vol. 2, part 1, pp. 318-23. NSC-139 is published in *FRUS, 1952-1954,* vol. 6.

42. For example see NSC-159/4, "Continental Defense," September 25, 1952, and NSC-5408, "Continental Defense," February 11, 1954, *FRUS, 1952-1954,* vol. 2, part 1, pp. 475-86, 609-24. See also NSC 5605, "Continental Defense," June 5, 1956. The report of the Killian Panel, "Meeting the Threat of Surprise Attack," February 1955, is discussed in Freedman, *Evolution of Nuclear Strategy,* pp. 158-60, and Kaplan, *Wizards of Armageddon,* pp. 130-31. The Gaither Report, "Deterrence and Survival in the Nuclear Age," is discussed in Freedman, *Evolution of Nuclear Strategy,* pp. 160-63, and Kaplan, *Wizards of Armageddon,* pp. 144-54.

Meanwhile, research efforts had been reoriented to meet the new threat of Soviet missiles.[43]

The Antiballistic Missile Debate

By the mid-1950s, as it became evident that the feared "bomber gap" would not materialize, the emphasis of research into air defense systems shifted to a search for means to counter long-range surface-to-surface missiles.[44] As early as 1953, the Army had begun to give serious consideration to that problem with the establishment of Project Plato, which studied the feasibility of tactical antiballistic missile systems designed to protect troops in the field. This particular project was cancelled in 1958, but by then it was clear that ABMs—or ballistic missile defense—could offer the Army the prominent strategic role it had been seeking.[45]

In 1955, evidence of Soviet advances in the development of long-range ballistic missiles prompted the Army to sponsor a feasibility study of potential means of defense against ICBMs. The results of the investigation, which was directed by Bell Telephone Laboratories, seemed promising and, in 1957, led to authorization for the development of the Nike-Zeus missile. Third in the Nike family, the Zeus was originally intended as a follow-on air defense missile that would compete with the Air Force's Bomarc.[46] It was to be a two-stage solid fuel missile that would have a range of approximately one hundred miles.[47] The Army now hoped that the nuclear-armed missile might be the key to a national ABM system that would provide effective defense against Soviet missile attack—a system that the Army would control.

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43. John M. Collins, *American and Soviet Military Trends Since the Cuban Missile Crisis* (The Center for Strategic and International Studies, Georgetown University, 1978), pp. 133–37.

44. The most comprehensive discussion of the ABM debate is found in Yanarella, *Missile Defense Controversy.* Other useful accounts are found in Freedman, *Evolution of Nuclear Strategy;* Herken, *Counsels of War;* Kaplan, *Wizards of Armageddon;* and the following: Alain C. Enthoven and K. Wayne Smith, *How Much is Enough? Shaping the Defense Program, 1961–1969* (Harper Colophon Books, 1971); William R. Schneider, Jr., "Missile Defense Systems: Past, Present, and Future," in Johan J. Holst and William R. Schneider, Jr., eds, *Why ABM? Policy Issues in the Missile Defense Controversy* (Pergamon Press, 1969); David N. Schwartz, "Past and Present: The Historical Legacy," in Ashton B. Carter and David N. Schwartz, *Ballistic Missile Defense* (The Brookings Institution, 1984); U.S. Office of Technology Assessment (OTA), "Ballistic Missile Defense Technologies," published in *Strategic Defenses* (Princeton University Press, 1986); and Herbert F. York, *Race to Oblivion: A Participant's View of the Arms Race* (Simon and Schuster, 1970).

45. Yanarella, *Missile Defense Controversy,* p. 27.

46. Ibid., pp. 27–28.

47. Ley, *Rockets, Missiles, and Men in Space,* p. 628.

Missiles seemed to offer the Army the prospect of obtaining its long-sought strategic mission, but here too there was frustration. The development of missile technology led to a growing interest in strategic defense on the part of the Air Force. This reflected less an acceptance of the arguments for an active defense than it did a desire by the Air Force to gain control of all missile programs. By now it was clear that offensive missiles would become a major component of the American deterrent, and the Air Force wanted to control them. Defensive missiles were largely seen as part of the package.

Competition between the Army and Air Force for operational control over both offensive and defensive missile programs, along with other jurisdictional disputes among the services, led Secretary of Defense Charles Wilson to issue a memorandum on November 26, 1956, clarifying service roles. Again, the Army fared badly. The Air Force was given control over the development and deployment of intermediate-range ballistic missiles (IRBMs)—its Thor missile winning out over the Army's Jupiter. Jupiter was later saved when the Soviet launch of Sputnik prompted the Defense Department to proceed with both missiles; it went on to serve as the launch vehicle for America's first satellite. The Air Force was also given responsibility for the development of surface-to-air missiles for area defense. All that the Army could salvage at this time was control over SAMs for point defense.[48]

Despite its disappointment, the Army determined to make the most of its air defense mission and was soon devoting up to 15 percent of its budget to this purpose.[49] The memorandum had done little, however, to end competition between the services over defensive missiles because of its failure to define the terms "area defense" and "point defense." The Army, with its Nike-Zeus, and the Air Force, with its Wizard program, each continued to seek total control over ballistic missile defense. Even the Navy briefly entered the contest, making a short-lived case for the Talos-Terrier-Tartar family of shipboard SAMs that emerged from its Project Bumblebee.[50]

Final resolution of the jurisdictional dispute came on January 16, 1958, when Secretary of Defense Neil McElroy assigned to the Army sole responsibility for the development and operation of an ABM system. The Air Force was directed to support the development of communications and radar components for the proposed system and to step up construction of its Ballistic Missile Early Warning System (BMEWS), which had begun the previous year. There were a number of factors behind this decision. The Air Force was ambivalent about BMD despite its desire for control of the

48. Yanarella, *Missile Defense Controversy*, pp. 29-31.
49. Ibid., p. 31.
50. Ibid., pp. 27, 32-36.

program. Also, some defense officials hoped to buy off discontent within the Army over its continued exclusion from major strategic missions. Most important, however, was the clear superiority of the Nike-Zeus to any of the missiles under development by the Air Force.[51]

Also in 1958 came the creation of the Advanced Research Projects Agency (ARPA—later DARPA, as "Defense" was added to the name) to coordinate research and development within the Department of Defense. ARPA was given responsibility for ABM development beyond Nike-Zeus and soon began a long-term study of advanced BMD concepts, known as Project Defender. Over the years, it also funded a number of feasibility studies on missile defense systems conducted by the services.[52]

Development of the Nike-Zeus continued, spurred on by increased funding in the wake of Sputnik, but the decision giving the Army control over ABM programs did not mean that a system would actually be deployed. Even within the Department of Defense there was considerable skepticism about the technical feasibility of ballistic missile defense. In the spring of 1958, shortly after McElroy's directive, a Pentagon panel known as the Reentry Body Identification Group concluded that an ABM system could not be made to work in the foreseeable future. This view was supported by the President's Science Advisory Committee in a report issued in May 1959.[53]

Throughout this period, the Army lobbied for funding to begin production and deployment of the Nike-Zeus, but each time it was denied. Opposition came from the Air Force—which might be expected—and increasingly from the Office of the Secretary of Defense (OSD), where concerns about the effectiveness of the proposed system were mounting. Many had come to believe that the Nike-Zeus would not be able to stand up to the sort of heavy ICBM attack that the Soviets might be capable of launching by the late 1960s and particularly that its tracking and acquisition radars would be vulnerable to such potential countermeasures as decoys and chaff. Furthermore, with an election on the horizon, the Eisenhower White House was not enthusiastic about the program's estimated cost of $15 billion. Funding for research and development would continue, but that was to be all for the time being.[54]

With the inauguration of the Kennedy administration in 1961, the Army resumed its efforts to secure funding for deployment of an ABM system, and it found a growing number of allies in Congress. Kennedy's campaign

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51. Ibid., pp. 40–41.
52. Ibid., pp. 40–41.
53. Kaplan, *Wizards of Armageddon,* pp. 343–44; Enthoven and Smith, *How Much is Enough,* pp. 184–85; Schwartz, "Past and Present," p. 333.
54. Yanarella, *Missile Defense Controversy,* pp. 60–61; Enthoven and Smith, *How Much is Enough,* pp. 185–86.

rhetoric about a supposed "missile gap" had prompted an increasing popular interest in defensive systems that would continue even after it was later demonstrated that any such gap was overwhelmingly in America's favor. In April, however, the administration elected to defer any such decision until the missile had completed its test program.[55]

Meanwhile, as doubts about the effectiveness and cost of the Nike-Zeus continued to grow within the Pentagon, Defense Secretary Robert McNamara increased funding for advanced ABM research. Project Defender, which had been examining such "exotic" BMD technologies as plasmas, chemical lasers, and X-ray lasers driven by nuclear explosions, concluded that none would be feasible until at least the 1980s. ARPA also sponsored a growing variety of service research projects. Among the more prominent of these were the Air Force's BAMBI (Ballistic Missile Booster Interceptor), which would have employed hundreds of missile-armed satellites to attack Soviet ICBMs; the Army's SAINT (Satellite Interceptor) and Field Army Ballistic Missile Defense System, an outgrowth of the Plato study; and a Navy program called Typhoon.[56]

None of these projects went beyond the basic research stage, but they did reflect a growing disenchantment with Nike-Zeus and the desire for a viable alternative. This sentiment continued, despite successful tests of the missile conducted in 1962. In mid-July, a Nike-Zeus intercepted a target Atlas ICBM over the Pacific Ocean. Two other successful tests followed in that year, including one involving the use of decoys.[57] Yet, while they provided valuable data, the tests did little to dispel doubts about the Nike-Zeus system. The interceptor was too slow—thus precluding the use of the atmosphere to filter out decoys—and the mechanically-steered radars could be too easily overwhelmed by a saturation attack.

On January 5, 1963, Secretary McNamara announced that the Nike-Zeus ABM system would not be deployed and that the program would be phased out at the conclusion of testing. In its place would come a program of research and development on a more advanced ABM system, to be known as Nike-X. McNamara also stated that the deployment of any future system should be accompanied by a massive program of civil defense as a matter of the highest priority. Without a sufficient number of fallout shelters, he argued, the effectiveness of BMD as a means of population defense would be severely limited. Similar arguments had been made in the 1950s in con-

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55. Yanarella, *Missile Defense Controversy,* pp. 64–66.

56. Ibid., pp. 73–75.

57. Schneider, "Missile Defense Systems," p. 4; Yanarella, *Missile Defense Controversy,* p. 82.

nection with continental defense, but civil defense was always deemed too expensive to pursue on a large scale.[58]

The proposed Nike-X system addressed many of the failings of its predecessor. First of all, it would be directed by phased-array radars which would be steered electronically—projecting beams much as the electron gun of a television fires at the screen—rather than mechanically. It was hoped that this would enable the system to handle large numbers of targets simultaneously and prevent saturation. For terminal defense, the system would employ a new high-acceleration missile called Sprint. The speed of this nuclear-armed interceptor would allow it to use the atmosphere to filter out decoys (which are not hardened to withstand reentry) and attack only actual warheads. To provide area defense beyond the localities where Sprint was based, the Nike-X system would also field a long-range interceptor which would engage targets above the atmosphere. This missile, called Spartan, was to be derived from the Nike-Zeus and would also carry a nuclear warhead.[59]

The Army would control the new program and hoped that a decision on production and deployment might be reached at an early date. McNamara, however, was determined that no such decision would be made until the system had been fully tested. This angered ABM supporters in Congress, and over the next several years, the defense secretary was forced to fight off repeated attempts to appropriate funds for the deployment of Nike-Zeus and for the early production of Nike-X components. Congressional interest increased in 1964 with the circulation of unofficial reports that the Soviets were beginning to deploy ballistic missile defenses around Moscow.[60]

McNamara's desire to defer a decision on deployment of an ABM system was not based solely on issues of technical feasibility. Increasingly, he was coming to the view that ballistic missile defenses should not be deployed even if they could be built. McNamara's doubts were many and were largely supported by the results of studies carried out at the direction of OSD. Among these were the Threat Analysis Study (or Betts Report), a wide-ranging investigation of the strategic implications of ABM deployment begun in 1963, and an ongoing series of reports on specific problems prepared in the Office of Systems Analysis.[61]

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58. Yanarella, *Missile Defense Controversy,* pp. 87–91; Enthoven and Smith, *How Much is Enough,* pp. 185–86.

59. Yanarella, *Missile Defense Controversy,* p. 91; Enthoven and Smith, *How Much is Enough,* p. 186. See also OTA, "Ballistic Missile Defense Technologies," p. 45; Schneider, "Missile Defense Systems," pp. 5–6; and Kaplan, *Wizards of Armageddon,* p. 345.

60. Yanarella, *Missile Defense Controversy,* pp. 92, 104–6; Enthoven and Smith, *How Much is Enough,* p. 187.

61. Yanarella, *Missile Defense Controversy,* pp. 111–13; Enthoven and Smith, *How Much is Enough,* pp. 187–89.