

Book Reviews

Safeguard: Experts Continue the Debate

ABM. An Evaluation of the Decision to Deploy an Antiballistic Missile System. ABRAM CHAYES and JEROME B. WIESNER, Eds. xxii + 282 pp., illus. Harper and Row, New York, 1969; cloth, \$5.95. Signet (New American Library), New York, 1969; paper, 95¢.

Why ABM? Policy Issues in the Missile Defense Controversy. JOHAN J. HOLST and WILLIAM SCHNEIDER, JR., Eds. Pergamon, New York, 1969. xiv + 322 pp. \$6.95.

Public controversy over the strength or composition of our military forces has been very rare in the last 20 years. Usually, the military has worked out its requirements with some guidance as to its mission from the administration, the technical experts have worked out systems to meet the military requirements, and an acquiescent Congress has generally accepted anything bearing the label "for defense." There have been minor arguments with Congress over details of military systems, such as who should build the F-111 airplane or how many nuclear-powered ships we should have, but the serious attention of Congress and of the American public has not been engaged by discussion of weapons systems. Political campaigns have sometimes brought questions about weapons to the fore, as in the "missile gap" debate of the 1960 presidential campaign, but these have quickly faded from public consciousness with the end of the campaign. Fights involving the technical experts over particular strategic doctrines and hardware have been had in plenty, but they have usually been conducted privately within the administration. These fights have been refereed and settled at various levels, depending on the prominence of the fighters and the importance of the fight, and the generally accepted rules said that the loser accepted the decision and went on to other things. This has been particularly true of those who have opposed an increase in weapons, since the disposition of Congress and the country has been until recently to ac-

cept anything that protects us from Communism as long as it only costs money.

Twice before the current ABM controversy, a military program has seemed to cost more than money and the attention of the people has been engaged—over fallout and nuclear-weapons tests and over the civil-defense program and backyard shelters. The concern expressed by the American public over these issues forced our leaders to review their policy, with the results that we began negotiations on the atmospheric test-ban treaty and the shelter program was quietly abandoned.

In late 1967 the Johnson administration decided to go forward with the deployment of an anti-ballistic-missile system (Sentinel), and in early 1968 Congress approved the deployment. However, the number of Congressmen who either opposed the system or wanted a full-scale public debate over the issue increased significantly over the normal very small group who had in the past opposed increased armaments, and the experts took their first timid steps to bring the argument out of the administration and into public view. The public didn't pay much attention, however; there was too much else to think about in that presidential election year.

In late 1968 the Army began to acquire land for the defensive missile sites, most of which were located in the suburbs of large cities. The public found that again it was going to cost more than money: there would be "hydrogen bombs in our backyards." The controversy heated up enough to receive wide attention from the national press, and this, coupled this time with the opposition of some very prominent members of the Senate, assured a thorough public debate. The experts who opposed ABM deployment became more bold, and wrote position papers for Congress and offered to testify before the committees of the Senate. Many scientists who were not experts made

themselves such and gave public talks to any group that would provide a platform. Many academics were driven into action by the brutal if uninformed criticism of their students over the misuse of science and technology.

Clearly Vietnam and the tensions inside American society have a great deal to do with making opposition to a weapons system respectable again. In that wretched war in Vietnam we have seen the fantastically strong military machine of the United States stalemated by a very weak military machine and have begun to wonder about the usefulness of all our armed strength. We have heard our military commanders too often promise victory and have begun to doubt their judgment. We have seen our society strained to near the breaking point over race and poverty and heard our political leaders tell us we can't afford the funds to solve the problems, and have begun to question our national priorities. All of these great issues are reflected in the controversy over the ABM, and in the alliance of people who oppose it. This alliance is a mixture of (i) the technical experts who give advice when asked and who think that on narrow strategic grounds the ABM is not needed or won't work or is not cost-effective; (ii) those who have struggled for years for arms control and see the moment of *now* as the last chance to stop the useless proliferation of weapons short of another great swoop up in the arms race; (iii) those who think that through Congressional laziness and public inattention the U.S. has become too much dominated by a military-industrial bureaucracy and see this as a chance to bring about a change in direction; and (iv) those who see our internal problems as of overriding importance and begrudge funds spent on other things. Most opponents probably have a mixture of these motives.

These books are about the first two issues. *ABM: An Evaluation* is specifically about the immediate issue of deployment of the Safeguard ABM system. Its genesis came in February 1969 when Senator Edward Kennedy suggested to Chayes and Wiesner that an independent, nongovernmental evaluation of the ABM would be useful in the upcoming Congressional debate. They assembled a distinguished group of collaborators, many of whom were prominent in the Kennedy and Johnson administrations (Goldberg, Kaysen, Moyers, Sorensen, Wiesner, Yarmolin-

sky), and produced a book in what must be record time. The book consists of a series of essays by expert contributors on various facets of the ABM issue: a superb introduction by Senator Kennedy sets the stage for the discussion, and is followed by a long first chapter by Chayes, Wiesner, Rathjens, and Weinberg, mostly devoted to a summary of the technical arguments against Safeguard deployment.

Why ABM?, edited by Holst and Schneider, appears to be partly a response to the general public clamor about ABM's and partly a response to the Chayes-Wiesner book. It, too, is a collection of essays. The contributors are all staff members and fellows of the Hudson Institute, an organization not well known to the public but a prominent Defense Department "think tank" since 1961. All of the contributors are specialists in strategic policy matters, as are a large fraction of the contributors to the Chayes-Wiesner book. Although Holst and Schneider state in their introduction that the book is devoted to issues related to missile defense in general, a good part of the book is directly in answer to the issues raised by the opponents of the Safeguard system.

The Safeguard system has several missions: to defend our strategic retaliatory force against the Soviet Union, to defend the entire United States against a light attack such as the Chinese might be able to launch in the mid-1970's, and to defend against an accidental attack from any quarter. In the first phase of deployment, the Safeguard system can be used only for the first of these missions, and hence the public wrangle about immediate deployment has been dominated by the question of preserving our nuclear deterrent in the face of a buildup in Soviet missile strength to the point where it is now roughly comparable to our own. The pro-ABM people extrapolate the size of the Soviet missile forces into the future, using the rate of growth inferred from observations by our satellites in the past few years, and conclude that our deterrent might not be secure by the mid-1970's. The anti-ABM people say that even if the Soviet forces do grow at the rate postulated by the pro-ABM people, our deterrent will still be secure in the mid-1970's. All parties to this argument—the technical experts who have testified before Congress, the Department of Defense spokesmen, and all the contributors to

U.S. Defense Department estimates of the damage that could be inflicted on the Soviet Union in a retaliatory strike with 1-megaton warheads.

Warheads on target (number)	Direct fatalities (millions)	Destruction of industry (%)
100	37	59
200	52	72
400	74	76

both these books—make the same basic assumption: that the best way to prevent a nuclear war is to have sufficient numbers and diversity of weapons so that we can destroy the society of the attacker even after receiving the full weight of his maximum surprise attack. In the jargon of strategic analysis this is called "inflicting unacceptable damage." The immediate question which pops to mind is, What is unacceptable damage? There is, of course, no precise answer, because we have to guess at what the Soviets will consider unacceptable to their society, and they have to make the same guess about us. The number that we guess is the nub of the entire argument over whether we need a ballistic missile defense.

If one makes a practice of reading certain journals, or the hearings of Congressional committees, or the annual defense posture statements of the Secretary of Defense, one may have some feeling for the power of nuclear weapons and the incredible damage they can cause. Since most people don't read such things and these numbers are the important ones in deciding if our retaliatory forces are vulnerable, I have listed in the accompanying table some numbers from a Defense Department report on estimated damage to the Soviet Union in a retaliatory strike by us using 1-megaton warheads. (Neither book mentions the subject.) The official table goes to considerably larger numbers of warheads, but damage increases slowly beyond the numbers listed here because all the big targets are gone. To complete the picture, the number of weapons we have is needed. We have now about 1000 Minutemen with megaton warheads, 41 Polaris submarines with a total of about 650 missiles with megaton warheads, and 650 manned bombers each able to carry several megaton-class warheads. If MIRV is deployed, the Minutemen and submarine missiles will each carry several smaller warheads, and several small warheads are more effective, per megaton, than one big one.

Against this background, it is absurd to think that the detailed calculations of the experts (including those in these two books) on numbers of Minutemen to survive a Soviet attack are significant. For example, in *ABM: An Evaluation* Wiesner (p. 73) calculates that about 270 Minutemen would survive a surprise attack by a Soviet missile force of the size postulated by Secretary Laird for the mid-1970's. In *Why ABM?* Wohlstetter uses different assumptions about the reliability and technological capability of Soviet missiles in the mid-1970's and concludes that about 60 Minutemen would survive. With enthusiasm, he rips apart the calculations of rival experts and shows that, had they used the correct blast resistance of Minuteman or had they made his assumptions about the reliability and technology of Soviet missiles, they would have arrived at the same conclusions he did. It does not seem to me to make a great deal of difference. Since pro-ABM people are not noted for underestimating Soviet abilities, I suggest that the reader take Wohlstetter's estimate of 60 Minutemen, add some number of surviving submarines (10 percent = 65 missiles), and see what you think of that as a deterrent. If you're not satisfied, you still have some fraction of the manned bomber force to throw on the scale, and if you're still not satisfied you can add the tactical air force in Europe with its nuclear weapons.

There is a story (one hopes fictitious) of a war game in the late 1940's. Several officers were given a city plan and told to plan a nuclear attack to knock it out. The average number of 20-kiloton weapons used was five. The plan was, of course, the city map of Hiroshima. The present situation is very like that story. Even the most conservative calculation gives enough of a deterrent. The ABM gives much more than enough.

In the first three chapters of *ABM: An Evaluation*, Chayes, Wiesner, Rathjens, and Weinberg, Kaysen, and Wiesner discuss the question of the urgent requirement for the deployment of an ABM to protect the Minuteman forces. These chapters discuss (among other things) our forces and their composition and strength, the problem of extrapolating the Soviet missile buildup of the last few years into the mid-1970's, the problem of coordinating an attack on all of our forces so as to preclude a retaliatory strike by us, and

more. The discussion is very thorough. All the information is given to allow a reader to draw his own conclusions independent of theirs. Their conclusion is that there is no need for ABM deployment now because there is no practicable way for the U.S.S.R. to reduce our forces below the strength required for a retaliatory attack. They are very convincing, but then I was convinced before I read the book.

The only discussion of need for a Minuteman defense in *Why ABM?* is in chapter 2, by Herzberg. It is not really a discussion but rather an assertion of need in two paragraphs. Herzberg agrees that Safeguard is not the most effective way of defending Minuteman, but he thinks that the need is real and urgent, and favors Safeguard deployment as the only technology available now. If I thought a defense was required, I should agree; but I do not see that he or any other contributor to *Why ABM?* has demonstrated an urgent need.

There are several chapters in *ABM: An Evaluation* that deal with both the effectiveness and the cost of defending Minuteman assuming the defensive system works, and with the question of whether the system will work at all. In particular, Weinberg's chapter on cost and effectiveness is quite well done and concludes that we get very little defense for the cost with Safeguard. The argument made in other chapters that Safeguard cannot work reliably is not impressive. In *Why ABM?* the point is made by several contributors that it doesn't really matter very much if the system won't work well in a war; the name of the game is deterrence of war, and what really matters, therefore, is whether a potential enemy can dare to believe it won't work at all. Questions of cost-effectiveness and reliability are really relevant only to a discussion of alternative means of accomplishing the same ends.

The most important questions raised in both books concern arms limitation. We and the Soviet Union find ourselves with huge stocks of strategic arms that are of no use to either. The two sides agree that neither's security is enhanced by the possession of excessive numbers of nuclear weapons. In spite of this, we and the Soviet Union have been unable to come to an agreement on limiting the production and deployment of strategic arms. Both of these books emphasize again and again the importance of an arms control agreement with the Soviet Union. The evaluations of the ef-

fects of an ABM deployment, however, are nearly mirror images.

In *ABM: An Evaluation*, the contributors argue that deployment of the Safeguard system will make arms control much more difficult and will lead to another round in the arms race. Their argument rests primarily on the characteristics of the Safeguard system. Its components are those that were originally designed for a defense of cities, and city defense upsets the strategic balance. Since the longest lead time in building a defensive system is that required for setting up production facilities and testing and modifying the operating system, they argue that the Soviet Union must start now to develop a counter to a city defense even though we now say we have no intention of deploying one. Thus Safeguard must inevitably provoke another round in the arms race.

The conclusion reached on this question in *Why ABM?* is that an ABM system will not necessarily cause further buildup in offensive armaments. The contributors argue that the Soviet Union has always been defense-oriented, that the leaders of the Soviet Union have publicly favored defensive weapons systems, and that therefore a defensive weapons system will not provoke a response.

If the Safeguard system were built of components useful to defend only our retaliatory forces, I might believe that deployment would have little if any effect on the arms race or on the prospects of negotiating an agreement. However, since deployment of this system would decrease the lead time for development of a heavy defense by three to five years (Kahn's estimate in *Why ABM?*), and many prominent proponents of the ABM are still arguing for a heavy city defense (see Brennan's chapter in *Why ABM?*), I cannot see how the U.S.S.R. could allow this system to be deployed without responding.

There are many parts of both books that I have not discussed—on China, nonproliferation, effects on Europe and Asia, the history of arms control negotiations, and others. These are all questions involving national policy and its international implications, as are virtually all the *important* questions in the ABM debate. Having read both books, I'm left with an impression that perhaps the authors didn't intend. I find the technical differences between the two sets of experts to be minor in spite of the enormous amount of heat and smoke generated about them in the

public debate. All of the important differences are matters of political judgment.

Both books are important reading: *ABM: An Evaluation* because, regardless of the outcome of the present debate in the Senate, this issue will come up again, and the public debate has been about the wrong things; and *Why ABM?* because of the insight it gives into the general problem of strategic policy. The people who come out badly in these books are those who are not mentioned in either—the political leaders in the administration and in Congress who have allowed the pursuit of technical superiority to dominate the pursuit of national and world security.

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Fluxions and Optics

The Mathematical Papers of Isaac Newton. Vol. 3, 1670–1673. Edited by D. T. WHITESIDE, with the assistance in publication of M. A. Hoskin and A. Prag. Cambridge University Press, New York, 1969. xl + 576 pp. + plates. \$32.50.

In recent years funds and dedicated scholarship have been found to start the work that eventually will lead to the long-delayed complete edition of all of Newton's works, published and unpublished. Four volumes of *Correspondence* have so far appeared, covering the years 1669–1701. Two volumes of *Mathematical Works* have gathered together published English versions of Newton's mathematical tracts, all from the 18th century. Now, again under the competent editorial guidance of D. T. Whiteside (who is also responsible for the *Mathematical Works*), are appearing the *Mathematical Papers* (mark the somewhat confusing difference between "Works" and "Papers"). They will bring us, in eight volumes, all Newton's extant notes and manuscripts, accompanied by English translations. In 1967 and 1968 the first two volumes appeared, covering the years 1664–1670, which comprise Newton's "golden age" of discovery. The third volume brings us up to 1673.

In 1669 the 26-year-old Newton, whose discoveries in analysis and optics, as yet unpublished, had impressed, among others, his teacher Isaac Barrow, had succeeded Barrow in the Lucasian