

F. A. S. NEWSLETTER

FEDERATION OF AMERICAN SCIENTISTS—Founded 1946—
A national organization of natural and social scientists and
engineers concerned with problems of science and society.

SPECIAL ISSUE ON
ORSA ABM REPORT

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Marvin L. Goldberger, Chairman
S. E. Luria, Vice Chairman

OPERATIONS RESEARCH SOCIETY OF AMERICA (ORSA) GOES POLITICAL

In 1969, a great debate over the SENTINEL-SAFE-GUARD ABM went forward in Congress. Lined up against the ABM were the large majority of senior names of science with experience on Government weapons systems: Presidential Science Advisers Kistiakowsky, Weisner, Hornig and Killian; Nobel Prize winner Bethe; ex-Government officials such as Eisenhower's DDR&E Chief Herbert F. York; former ARPA Director and IDA President Jack P. Ruina; CIA's former Deputy Director for Science and Technology Herbert Scoville, Jr.; Director of ACDA's Bureau of Science and Technology Franklin A. Long; former head of the Weapons System Evaluation Division (WSED) George P. Rathjens; and all three former Chairmen of the President's Science Advisory Panel on Strategic Weapons Systems of the last decade: Marvin L. Goldberger, Sidney Drell and Wolfgang K. H. Panofsky.

Administration supporters organized a lobbying arm: "Committee for a Prudent Defense Policy". It was led by the late Dean Acheson (Chairman), Paul Nitze (who was promptly offered a position on the SALT delegation) and mathematical logician turned strategist Albert Wohlstetter. During the debate, Wohlstetter supplied most of the SAFEGUARD-relevant, non-Administration comment.

The debate can only be understood by remembering the way it unfolded. The Congressional debate over the Johnson Administration's Sentinel ABM was underway as the Nixon Administration took office. A bomb-in-the-backyard debate then arose in which citizen groups protested the Army's plans to put ABM installations near cities.

Offering to review the situation in a month, the Nixon Administration halted ABM work and considered various alternatives. It concluded (and publicly announced on March 14) that an ABM designed to protect U.S. cities against the Soviets was not technologically possible. It noted privately that the Sentinel anti-Chinese defense did not have wide political support, that the Chinese ICBM threat had slipped, and that scientists and strategists were already testifying that an anti-Chinese ABM would make negotiations difficult with the Soviets by accelerating Soviet offensive weapons.

The Administration decided to put its main emphasis upon a third possibility — formerly a little-mentioned option: to use the ABM to protect U.S. Minuteman missiles. It reasoned that no strategic logic could oppose our defense of our deterrent — nothing provocative about that.

The shift to a new ABM rationale — unquestionably a response to a political problem — had two immediate weaknesses. The Administration was faced with showing

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MAJOR TECHNICAL FLAWS

The ORSA report has major technical flaws.

It failed to consider the adequacy of SAFE-GUARD to protect Minuteman which was the fundamental question in the debate.

In considering the narrower question of the vulnerability of our land-based deterrent, ORSA assumed the practical utility of two crucial tactics upon which the Soviets would have had to rely completely, but on which they could not have so relied: very high quality reprogramming and pindown.

These important errors, and a host of other indications of bias and inappropriate procedures, discredit the conclusions of the ORSA panel.

Marvin L. Goldberger
Herbert F. York
Herbert Scoville, Jr.
Sidney Drell
Franklin A. Long

"Reprogramming" refers to the ability of the Soviet Union to fire new missiles after old ones that fail. ABM proponents argued that the Soviets might reprogram for failure not only at count-down and launch, but also for some or all inflight failures. Opponents argued that the Soviets could not rely upon this tactic — which tactic would have been critical under proponent calculations — since relatively few Soviet Minuteman-killing warheads were estimated to be available for multiple firings at each target.

The argument over "pindown" referred to the possibility that Soviet submarine-launched missiles might pin down U.S. Minuteman missiles with a barrage of detonations above U.S. silos. Hence these smaller submarine-launched warheads might discourage U.S. Minutemen firing until Soviet ICBMs arrived to destroy Minuteman. Thus the short-flight-time-sub-launched missiles might catch U.S. bombers on their bases while pinning down the U.S. ICBMs until the latter could be destroyed.

However, the Soviets would be foolish indeed to rely upon such a tactic. Why should American planners wait until the Minutemen are destroyed? Why not fire — take one's chances on survival of the Minutemen in passing through the barrage — and hold Polaris weapons in reserve if any reserve is wanted. (Evidently the Air Force agrees with the ABM opponent's analysis that pindown is not feasible. See the testimony of its Lieutenant General Glaser, Deputy Chief of Staff for Air Force R&D, before the House Armed Services Committee, part 2, pg. 4351, March-April 1971.)

ORSA GOES POLITICAL, from Page 1

first that our Minuteman missiles were becoming vulnerable and second that the SAFEGUARD ABM was an adequate defense against the Soviet threat projected.

At this point the Soviets had about 1,000 SS-11 missiles which then, and now, have insufficient accuracy to attack Minuteman missiles. To justify the threat to Minuteman, it was necessary to explain how the larger SS-9s might in future destroy 1,000 Minuteman missiles. The Administration suggested that the Soviet Union would have three 5-megaton multiple independently guided reentry vehicles on each SS-9. (Thus far, 2½ years later, no Soviet confirmed test of true independently guided reentry vehicles (MIRV) has been made.) The Administration argued further that the Soviets might build 50 SS-9s per year so that it would have 420 by the mid-seventies. This would have produced 1,260 warheads.

This still failed to produce sufficient warheads to put Minuteman in jeopardy by a date sufficiently close to require an immediate start on SAFEGUARD. In April, Albert Wohlstetter testified that the Soviets might use a method which the U.S. had previously considered (and rejected in secret) called reprogramming — missile failures are noted and further missiles are sent to replace them. Thus, "backup" warheads need not be fired in those cases where no missile failure is noted. On May 12 — two months after SAFEGUARD was announced — DDR&E Chief John S. Foster adopted this line in a speech in Dallas. The plausibility of the notion that the Soviets might rely upon a reprogramming device of this kind to launch a surprise attack was hotly debated. It became the crucial assumption on the vulnerability of Minuteman for the mid-seventies.

ABM opponents considered the matter of Minuteman vulnerability less critical than the question of SAFEGUARD adequacy. They conceded in testimony that Minuteman would eventually become vulnerable if the Soviet offensive buildup sought to make it so. Their central argument was that SAFEGUARD would not be adequate to defend Minuteman, if indeed Minuteman became vulnerable. This argument turned on the fact that SAFEGUARD — designed for Sentinel ABM components — had been built around large expensive radars which would necessarily be bought in small numbers and be vulnerable to Soviet attack. In short, the proponents emphasized the coming possible danger. The opponents emphasized the inadequacy of the proposed solution.

Wohlstetter Seeks Vindication

On November 8, 1969, Albert Wohlstetter wrote the Operations Research Society of America, of which he was a member, and asked them to look into the professional conduct of his opponents. In his letter, he emphasized his desire that they consider the question of the vulnerability of Minuteman — the "important issue I have described". He noted that they need not consider the "entire range of issues". The anti-ABM scientists declined to participate in a review by an organization of which they were not members — one in which their chief opponent was a member. ORSA persisted in any case.

Widely reported in the press, the ORSA report, unsurprisingly after such a beginning, condemned those it investigated (Rathjens, Wiesner, Ralph Lapp and Steven

**ORSA REPORT
RELEASED BY SLIM MAJORITY**

The ORSA report took the form of an Ad Hoc Committee on Professional standards composed of six persons. The ORSA Council agreed to look into the matter on November 11, 1969, and considered the completed report on May 5-6, 1971. At the latter meeting of the 13 officers and council members of ORSA, two had been involved in drafting the report but did not disqualify themselves from voting. Six other ORSA officials also voted for its release. The remaining five opposed its release in a jointly-signed minority report.

The five-man minority argued that ORSA should not take on the "quasi-judicial function of investigating and reporting on professional behavior of individuals". (The word "quasi-judicial" was applied to the investigation even by ORSA's President, a supporter of the investigation.) The minority noted the lack of full access, the absence of a right of subpoena, the disinclination of persons investigated to participate, and the absence of ground rules. The minority further noted that the report should have been refereed.

Weinberg) and approved the work of Wohlstetter. In order to do so, however, ORSA simply ignored the most important issue (the adequacy of SAFEGUARD) and continued to accept the Defense Department's assumptions without questioning them. (See the signed box in this newsletter and the summarized analysis provided by Richard Garwin.) On minor matters, they were pedantic and biased — as indicated in a paper excerpted elsewhere by Howard Margolis. In general, the ABM opponents have not changed their views, as indicated in the letter reprinted from George W. Rathjens — quite the contrary. Although the ORSA panel had 21 months to prepare its study, Rathjens and others have called it "technically incompetent".

**WHERE ORSA CONTROVERSY
DOCUMENTS CAN BE FOUND**

On October 4, Senator Henry M. Jackson placed the critical appendix III of ORSA's report in the Congressional Record along with articles from the Washington Post and New York Times. (Pages S-15720 — S-15737)

On October 15, Senator Alan Cranston placed in the Congressional Record a reply from Dr. George Rathjens, Jerome B. Weisner, and Steven Weinberg along with an editorial from the Boston Globe. (Pages S-16332 — S-16338) (See also, Senator Edward Kennedy, S-16457 — S-16464)

On November 12, Senator Stuart Symington placed in the Congressional Record, the letter from Richard Garwin summarized here. (Pages S-18320 — S-18323)

On November 11, House Republican leader Gerald Ford placed the Joseph Alsop Washington Post article of November 8, 1971 in the Record. (Pages E-12100-12101)

NON-PARTICIPANT IN DEBATE BLASTS ORSA

Dr. Richard Garwin had not figured publicly in the ABM debate. But he has been dealing with military weapon systems as a prominent scientific member of the President's Science Advisory Panel (PSAC) under the last three presidents. Garwin called the ORSA Council "unwise" in issuing its report because it had acted as a court without safeguards against abuse. More serious, he clearly believed it to be incorrect in its premises and conclusions.

Garwin argued that both Wohlstetter's position and the ORSA report suffered from "over-professionalism" — "sophisticated operations research techniques applied to shakey assumptions." He said: "In medicine, the operation can be a brilliant success, but the patient may die if the diagnosis is wrong."

Garwin noted that the difference between Wohlstetter and those he criticized turned on three points of disagreement:

1. the military utility of reprogramming ICBMs to replace failures before launch or during flight,
2. the feasibility of simultaneous missile attack on U.S. ICBMs and bombers, and
3. the robustness of the Safeguard system; i.e., the range of enemy force levels over which it would (a)

be necessary and (b) contribute substantially to the goal of preserving a specified number of Minutemen.

Reprogramming Implausible

Concerning reprogramming, Garwin called it "feasible in principle" but his letter went into detail on its many complications. Were he a first-strike planner he would require a force that could put two warheads on each Minuteman silo so as to make unnecessary the complications of reprogramming. ORSA should not have just dismissed the argument of anti-ABM scientists that reprogramming was implausible as a Soviet tactic.

Concerning the problem of pin-down, Garwin agreed with ABM opponents that pin-down would be most difficult. He argued that ORSA had placed the burden of proof incorrectly in requiring opponents to show that pin-down would *not* work — in fact, proponents had not shown any reasonable tactics by which it would work.

Safeguard Inadequate

Finally, concerning point three, Garwin clearly agrees with the analysis of the opponents saying:

Below a certain numerical offensive force level, Safeguard is obviously not needed to insure the survival of a minimum number of Minutemen. There is some number of SS-9's in the Soviet force which clearly overwhelm Safeguard so that it can no longer ensure that the minimum number of Minutemen survive. If

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LIVE DANGEROUSLY: OPPOSE AN ADMINISTRATION

1969

"Several highly placed and reputable U.S. scientists have spoken out in print against the Sentinel missile systems," Mr. Resor wrote to Mr. Clifford, and after naming a few of them (Hans Bethe, George Kistiakowsky, Jerome Wiesner) and complaining of the difficulty of replying without disclosing secrets, he went on to say:

"It is essential that all possible questions raised by these opponents be answered, preferably by nongovernment scientists.

"We will be in contact shortly with scientists who are familiar with the Sentinel program and who may see fit to write articles for publication supporting the technical feasibility and operational effectiveness of the Sentinel system.

"We shall extend to these scientists all possible assistance."

—*Washington Post* Editorial "The Big ABM Brainwash" February 17, 1969, commenting on and quoting from the Secretary of the Army Stanley R. Resor letter to the Secretary of Defense.

1971

THE WHITE HOUSE
WASHINGTON, D. C.

October 13, 1971

Dear Bob:

I am sorry that we haven't had a chance to visit on the phone, but you should know that the work of your Society has received a good deal of attention. It was in the President's news clips, and I have discussed it

personally with the President and senior White House officials. You might also be interested to know that I was in a meeting the other day in which Admiral Zumwalt discussed the work of the Society in a most favorable way. While not page one headlines, it has been widely covered in the daily newspapers. I am a bit disappointed that the weekly magazines have not yet touched on it. Possibly, some follow-up work might be helpful there.

All in all, I would say that you and the Society have performed a magnificent service. There is no question but that, in the future when "experts" present themselves before Congressional committees as professionals arguing for or against a given course of action, they will be considerably more careful about the quality and professionalism of their remarks and arguments.

To me the action by your Society, and certainly by you personally, is the kind of incremental act of leadership and good sense that makes this such a wonderful country.

My congratulations on the important part you played in it. I look forward to seeing you soon.

Warm regards,
Donald Rumsfeld
Counselor to the President

Mr. Robert Machol
Northwestern University
Graduate School of Management
339 East Chicago Avenue
Chicago, Illinois 60611

PS: I thought that the introductory section you wrote to the Society's report was well put.

NON-PARTICIPANT, from Page 3

the difference between these two offensive force levels should be small, say 10%, it would be very difficult for the Soviet Union, even if they wanted to, to build a force which would fall precisely into the range where Safeguard would be of some value to the U.S. Indeed, that is the case, not only because the Soviet Union can use the SS-9 multiple warheads, if it so wishes, to destroy the two Safeguard radars which defend any Minuteman at all, but the Soviet Union can use also some of the many SS-11's or could build some SS-13's or could allocate some of the vast number of SLBMs (which are supposed to be useful during a pindown attack) actually to destroy the two MSR radars without which Safeguard is useless in defending Minuteman.

ORSA Report "Demeaning" of Operations Research

Garwin argued that the ad hoc study was "guilty of the same faults of which it accused others" both in its "conduct and its content" and suggested that its publication was so biased as to be "demeaning" to the Operations Research profession. He supported the ORSA five-man minority report which argued that the study should have been re-fereed and called on the Society to disown it.

**ORSA REPORT CALLED BIASED
BY CHRONICLER OF DEBATE**

During the 1969 debate, Institute for Defense Analysis (IDA) analyst Howard Margolis produced a lengthy report on the SS-9/SAFEGUARD debate. The ORSA report moved him to a short paper commenting on it in light of his earlier analysis.

As a sample of what he felt can "only be called the bias of the report", he discusses the 12 pages devoted to the Wohlstetter-Rathjens argument over the ability of the SS-9 force to destroy Minuteman.

After charging that Rathjens gave an "overstated impression of the extent to which very conservative assumptions could indicate that Minuteman would not be gravely threatened", and that Wohlstetter "made the most of it", Margolis goes on:

"Now what else is there to say? In the opinion of the ORSA Committee, a great deal. Almost all of the 12 pages the report devotes to this matter is concerned with a detailed critique of Rathjens' handling of the calculations. Much of this degenerates into the most trivial kind of nit-picking. For example, Rathjens at one point said he used a chart put in the record by Secretary Packard and some data released in 1967 to make his estimate of Minuteman vulnerability. "Rathjens assertion . . . cannot be supported mathematically," reports the Committee. Why? Because you can arrive at the estimate using either the chart or the data, rather than both together. At another point Rathjens is criticized for purportedly misreading the Packard chart, although whether he did so is a matter of dispute over what information Rathjens and Wohlstetter exchanged in a private conversation. The Committee puffs a good deal over that one, and without deeming it worth mentioning to the reader that the "error" (if it occurred) had no effect whatsoever on the estimate Rathjens gave to the Senate Committee.

Although the Committee obviously considered such de-

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**FOUNDER OF ORSA
OPPOSES ORSA REPORT**

In a letter to the Boston Globe of October 2, Professor Philip M. Morse said:

[From the Boston (Mass.) Globe, Oct. 2, 1971]

Professor Morse Protest ORSA Report

I regret finding it necessary to protest the recent official approval of the Council of the Operations Research Society of America to a report which gratuitously, and I hope falsely, suggests that the society is on the side of ex Sen. Jos. McCarthy, is promilitary and supports the assumption that the expert always knows best.

I am talking about the impression the report is producing; the council must have known that occasional disclaimers and disavowals can't dispel the effect of the report on the general public, who will not read it carefully or will only know of it through the press.

The report, written by an ad hoc committee appointed by the council of the society and approved by the council for publication, will be considered unfair since it denounces, by name, persons who are not members of the society and who thus have had no means of controverting its effect, except after the fact.

They were allowed space in the report for counter argument, but they had no means of influencing the form of the report and were not represented on the council which approved its publication.

This already has given the impression that the society as a whole is against reduction of armament and is in general pro military; a few cautionary sentences in the preamble can't dispel this impression.

It implies that those with access to secret information must always be right in the assumption underlying their analyses and that those with opposing conclusions must either be dishonest or unscientific. By seeming to argue that there never can be honest differences of opinion regarding assumptions between scientists regarding questions of general policy, it comes down on the side of those who advocate letting a super computer make all our policy decisions.

I don't agree with any of these implications and I protest vigorously against council action which has put me in the position of appearing to approve them. If as I hope the majority of the members of the society feel the same way, then there must be something wrong with the way the society operates to make it possible for a council to place its members in so false a position. If I am wrong and the majority of members really do approve this way of settling a dispute between several ORSA members and several non-members, then I must regretfully sever relations with a society I helped to found, since it will have become a pressure group rather than a scientific society.

Philip M. Morse,
Professor emeritus, MIT first president of ORSA,
President-elect of the Physical Society of America,
Cambridge.

ORSA REPORT CALLED BIASED, from Page 4 tails highly significant, it apparently did not deem it significant to mention that two months before the Senate vote Rathjens had publicly retreated from the extreme impression that might have been created by his original statement. Nor did the Committee comment on the fact that Rathjens had, after all, provided Wohlstetter with an explanation of how he developed his estimate on the day before they were to testify — plenty of time, given the simplicity of the calculations both sides were doing, for Wohlstetter to thoroughly analyze Rathjens case. Rather, we get the elaborate review of Wohlstetter's claims that the explanation that Rathjens gave was not exactly right. The Committee takes that most seriously. Indeed the pages virtually brim over with outrage at Rathjens' behavior. Yet a much shrewder comment, I should think, would have been to see that Wohlstetter's performance on this matter smelled powerfully of red herring. The fact is that by Wohlstetter's own account, Rathjens gave him all the information he needed to duplicate Rathjens calculation. The whole fuss about Wohlstetter being unable exactly to duplicate the calculation from what Rathjens told him (or from what he understood Rathjens told him) is trivial, having no significant impact on the validity or lack of it of Rathjens' estimate.

Of course, if the purpose of the Committee was to help Wohlstetter undermine the credibility of the critics, it would be comprehensible why there is this extreme and tendentious focusing on trivia.* If, on the other hand, the purpose was to inform members of the technical and political communities on how properly the two sides handled themselves in the overall debate, the situation is very odd. For a non-technical reader, and indeed for technical

readers who had not followed the debate closely — as, for example, the vast majority of ORSA's own membership — the impression is given that what is being discussed was an important part of the debate and, further, it naturally creates the impression that the weak showing of the critics on this matter was typical of the debate as a whole."

*Which contrasts sharply with the gentle handling of a few examples of misstatements by Pro-Safeguard spokesmen elsewhere in the report.

ORSA "QUASI-JUDICIAL" STANDARDS AT ISSUE

As is not uncommon in scientific disputes, some of the participants may have had ample reason to be interested in discrediting the others. One of the ORSA Ad Hoc Committee Members had been a participant in the 1969 ABM debate under investigation — Howard K. Berger had been a Defense Department official at the time and even Deputy Assistant Secretary for Strategic Systems! Worse, he had been removed from a position of responsibility by the accused George W. Rathjens while working at the Institute for Defense Analyses, an action that led shortly thereafter to Berger's resignation. Evidently, the ORSA Ethics and Grievances Committee did not know of this, nor did Berger think it reason for disqualification in a "quasi-judicial" investigation.

By deleting 80% of the initial letter written to ORSA by Albert Wohlstetter, ORSA's editor concealed: the fact that ORSA had investigated only what was asked by Wohlstetter; that Wohlstetter had suggested to them virtually all of the minor criticisms they came up with; and that ORSA had not validated some of his assertions; e.g., that there had been "personal abuse" of him, and so on.

WHAT WAS THE ISSUE: THE "VULNERABILITY OF MINUTEMAN" OR THE "ADEQUACY OF SAFEGUARD"?

On the unclassified record here though, I would just like to say that it seems to me it is a matter of time. There is going to be some time, and I do not know when — it will be in the Seventies — when MINUTEMAN will be vulnerable. Accuracies are going to get better. The Soviet force is going to build up. The time is going to depend on the particular assumptions you make about the rate of that buildup, how reliable the Soviet missiles might be, the yields they can carry, and their accuracy.

But the fundamental point I would like to make — and it is more directly relevant to the question we are discussing, that is the SENTINEL or SAFEGUARD deployment — is that when that time comes, no matter when it is, be it 1974 or 1978, if we deploy SAFEGUARD, it is going to buy us very, very little in the way of improving the survivability of that force.

—George Rathjens, Senate Armed Services Committee, 1969

I am somewhat perturbed that the differences among the calculations of Drs. Wohlstetter, Lapp and Rathjens have been given this degree of attention. Fundamentally these calculations differ only in their assumptions on the reliable CEP of the Soviet MIRV warheads carried on the SS-9, on the assumed hardness of Minuteman, and on the targeting doctrine adopted by the Soviets in a first-strike attack. As expected the spectrum of assumptions ranging from highly conservative to highly unconservative would materially affect the results. Yet what matters is not the conservatism or lack thereof adopted by Drs. Wohlstetter, Rathjens and Lapp in their calculations but the Soviet authorities when debating a possible first-strike against Minuteman and, considering the always unknown reliability of their forces, they would have to be conservative indeed.

The prominence given to the numerical disagreement among these calculations which are a natural consequence of the spread in assumptions has obscured the main issue, namely the large uncertainty of the forecast as to how many MIRV'd SS-9's the Soviet will in fact have available in the 1970's, and the small number of anti-missiles which the Safeguard provides in intercepting them. These two numerical factors are, in my view, vastly more important than the spread among the calculations on survival of Minuteman under hypothetical SS-9 attack as developed by the various experts.

—Wolfgang K. H. Panofsky, Senate Armed Services Committee, 1969

JOSEPH ALSOP ADOPTS FAS

The Federation, its director, and "left-wing" scientists, have become Mr. Alsop's latest favorite target for smear — three such attacks have now been printed in the Washington Post and other newspapers in five months.

In the first attack, on May 26, 1971, Mr. Joseph Alsop suggested that the FAS analysis of DOD's "R&D Gap" claims was motivated by a subversive interest in getting DDR&E's John S. Foster "out of the way" because Foster was so often right in assessing the Soviet threat! Here Mr. Alsop was so confused as to describe Jeremy J. Stone as a left-wing political scientist from Princeton when in fact he is a mathematician from Stanford. But Mr. Alsop went much further and this column has to be seen to be believed. The L.A. Times refused to print it, although it is syndicated by the L.A. Times syndicate; many other newspapers followed suit.

A second similar attack, on October 27, contained the same implication of treason: "Dr. Jeremy Stone and a good many other misguided American scientists have formed [actually Dr. Stone was ten years old when FAS was formed] a powerful lobby primarily aimed, so far as one can see, to subordinating American strategic policy to Soviet strategic policy." On this occasion the L.A. Times deleted two references to Dr. Stone before printing this column.

On November 8, Joseph Alsop devoted another column to warning that "a great deal of the more leftwing 'scientific' evidence must now be expected to be as crooked as a ram's horn."

Only Mr. Alsop's unique reputation for abuse of his columnists' perogatives has protected FAS from serious harm from his nonsense. But despite his reputation, politicians can still fear his mud-slinging attacks. Hence these attacks can complicate the life of any public interest association like ours. Many Federation officers have expressed the hope that these attacks will bring us new infusions of funds and members. We hope so. We are not, we regret to say, as powerful yet as Mr. Alsop would evidently like to say we are.

RATHJENS RESPONDS TO ORSA AND ALSOP

(excerpts of letter to editor)

Joseph Alsop's column of November 8 for the most part accurately reflects the findings and tone of the recent critique by the Operations Research Society of America of the role of myself and others in the ABM debate. What Mr. Alsop failed to appreciate or convey to his readers was the fact that the ORSA report is a technically incompetent critique — based on bizarre procedural arrangements, selective use of evidence, and remarkably uncritical acceptance of Administration assumptions, many of which had little or no foundation in fact.

This is not the place to discuss all of the deficiencies of the ORSA report — we have done that in some detail elsewhere — but lest readers be misled by Mr. Alsop's column it is perhaps useful to comment on two issues in the ABM debate: the possible vulnerability of the U.S. Minuteman force to a Soviet SS-9 "first strike" in the mid-

70's, and whether the Safeguard ABM deployment would make a significant difference in Minuteman survivability.

Although the second question was really what the ABM debate was all about, ORSA focused its attention almost exclusively on the first, a hardly suprising fact since Albert Wohlstetter who instigated the inquiry, and whose lead it slavishly followed, had largely avoided commenting on Safeguard's utility in both his testimony and his specification of changes.

As regards Minuteman vulnerability, I would point out that estimates necessarily had to be based on interpretation of intelligence information and technical judgment of what the situation would be six years later. Various participants in the debate made quite different judgments, and such differences, not mathematical manipulation which was essentially trivial, nor the application of esoteric operations research techniques, accounted for my estimating that 25% or more of the Minuteman force would survive while Mr. Wohlstetter and Defense Department spokesmen estimated 5%. I leave it to the reader to draw his own conclusion as to whose judgments were more reasonable, pointing out that I would now revise my estimates of Minuteman survivability upward as it now seems even less likely than it did two years ago that the U.S.S.R. could fully equip its SS-9 force with highly effective multiple independently targetable reentry vehicles (MIRVs) by the mid-70's. Reports such as those by Michael Getler of a recent DoD/CIA sponsored study by TRW (*The Washington Post*, June 17), General Ryan's March 9 testimony before the House Appropriations Committee, and Secretary Packard's remarks of October 21 lead me to believe that the Administration too might now estimate very substantial survivability.

The Administration seems also to have largely come to the views of its opponents with regard to the question of Safeguard effectiveness. Thus, it is now recognized, even in the Defense Department, that the Missile Site Radar is the Achilles' heel of Safeguard, and there are serious efforts under way to design a dedicated hard-site defense employing less expensive radars as many of us recommended. And it is now considered, as we had suggested, that Safeguard as originally planned will be an inadequate defense if a build-up in Soviet missile capabilities continues, whereas originally it was argued that it was needed in case of such a build-up.

Mr. Alsop points out that we admitted mistakes. A single example will perhaps put that admission in perspective. I had argued that Messrs. Laird, John Foster and Wohlstetter had made unrealistic assumptions in imputing to the Soviet Union the capability, in executing an attack against us, of compensating for *all* their missile failures by replacing the failures with other warheads aimed at the same targets. In fact, Mr. Wohlstetter had, unlike Messrs. Laird and Foster, apparently assumed that 15% of the failures could not be so replaced. I was in error and was criticised by ORSA for the mistake. It is to be noted that neither Mr. Wohlstetter nor the Defense spokesmen offered any analysis to support their contention that such tactics were feasible. Yet, the ORSA committee did not criticise this omission. Rather, it attempted the back-up analysis for them, in so doing finding it necessary to use assumptions about Soviet MIRV technology totally at variance with observations! . . .

SCIENCE MAGAZINE ON ORSA REPORT

"Operations research, a group of techniques originally developed during World War II, has not entirely outgrown its military heritage, and many members of ORSA necessarily have past or present connections with the military establishment. ORSA is not ideally positioned to adjudicate a debate that directly pitted the Department of Defense against its critics, but its council seems to have had few qualms about acting on Wohlstetter's suggestion . . .

The ORSA council seems to have believed, perhaps simplistically that for Rathjens and Wohlstetter to have arrived at different conclusions from the same facts, one of them must have presented the facts incorrectly. Yet as Rathjens and his colleagues pointed out in their initial letter to ORSA, there was not always agreement even on the facts underlying the ABM debate, since some of the relevant information was classified and much that was unclassified was incomplete."

—SCIENCE Magazine, *ABM Debate: Learned Society Split by Old Grievance*, October 15, 1971
Nicholas Wade.

WHO HAS BEEN RIGHT ON ABM?

As one participant wrote to a Senator: "We are dealing with a subject where judgment based on technical knowledge and experience, rather than pedantic calculations based on ill-founded assumptions, are frequently most essential". How have the ABM opponents fared on judgment, over time?

In criticizing the ABM opponents, ORSA criticized men whose record on the ABM has been right four times on these four major ABM issues: Anti-Soviet defenses, the no-ABM agreement, anti-Chinese defenses, and the need to put smaller, harder and less expensive radars on SAFEGUARD.

Should the United States build an anti-ballistic missile system designed to protect American cities against Soviet attack (the thick defense)?

In the late fifties and early sixties, those scientists who opposed the ABM argued against deploying the NIKE-ZEUS in 1963-64. The Secretary of Defense pointed out in 1962 that the money would have been effectively wasted considering the requirements of 1963-64, by the time it became operational.¹

In the early 1960's the scientists who opposed the ABM argued against deploying the improved Nike-X which could have been ordered in 1963 and built by 1968. The Defense Department conceded in 1963 that it would have been obsolete by 1966.²

In the mid, and late, 1960's the scientists opposing the ABM continued to argue that it was not then technically

¹ U.S. Congress, House Subcommittee of the Committee on Appropriations, "Department of Defense Appropriations for 1964," Part I, pp. 434-35.

² U.S. Congress, Senate Committee on Armed Services, "Military Procurement Authorization Fiscal Year 1964" (88th Congress, 1st Session, 1963).

feasible to protect the United States against defense from Soviet missiles. They were right. On March 14, 1969, President Nixon said:

"Although every instinct motivates me to provide the American people with complete protection against a major nuclear attack, it is not now within our power to do so. The heaviest defense system we considered, one designed to protect our major cities, still could not prevent a catastrophic level of U.S. fatalities from a deliberate all-out Soviet attack. And it might look to an opponent like the prelude to an offensive strategy threatening the Soviet deterrent."

Without the opposition of the anti-ABM scientists, \$20 to \$40 billion could have been wasted on anti-Soviet city-protecting ABM systems during the 1960's alone.

Should the United States negotiate a "no-ABM" agreement with the Soviet Union to prevent either side from trying to build a thick city defense against the other?

In 1960 and 1962, the scientists opposing the ABM were already urging the Soviet Union to consider this possibility. In 1964, for example, one paper presented at an international arms control symposium warned the Soviet Union that the United States would build such an ABM if — but probably only if — the Soviet Union did so. This was right. Throughout the 1960's, the scientists opposing the ABM argued for a no-ABM agreement. They were right. On May 20, 1970, President Nixon disclosed that the super powers "have agreed to concentrate this year on working out an agreement for the limitation of the deployment of anti-ballistic missile systems". A handful of pro-ABM scientists argued that the Soviet Union thought ABM systems "defensive only" and that they would never agree to negotiate them away. They were wrong. President Nixon's announcement — just quoted — was signed also by the Soviet Government.

Should the United States build an anti-ballistic missile system designed to protect American cities against the Chinese ICBM threat?

Since the middle 1960's, the scientists opposing the ABM have argued that a defense against Chinese missiles was not justified. The Chinese could be deterred from attack; no defense would, in any case, be foolproof; and the anti-Chinese ABM would decisively interfere with an agreement precluding the Soviet Union from building an ABM defense against us. They were right. In 1971 the Senate Armed Services Committee conceded that the "wisdom of an anti-Chinese defense had yet to be demonstrated". And the SALT talks shows every evidence of going forward in a way that will preclude them.

Should the United States use SENTINEL ABM radars in SAFEGUARD to protect a fraction of its missile sites from Soviet attack?

The scientists opposing the ABM argued that its large radars were much too expensive and vulnerable and its stock of interceptors much too small. As a result, they said, the system would be overwhelmed if the Soviet threat went slightly beyond the point where SAFEGUARD was needed. The Soviets, they argued, would have to "tailor their threat" to SAFEGUARD to make it useful. They

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WHO HAS BEEN RIGHT, from Page 7

were right. A year later, in 1970, the Defense Department Posture Statement admitted:

"To be perfectly candid, Mr. Chairman, it must be recognized that the threat could actually turn out to be considerably larger than the Safeguard defense is designed to handle." (Pg. 49, prepared statement of Secretary Laird)

The scientists opposed to SAFEGUARD argued in 1969 that such a defense would have to have smaller, cheaper radars (which should therefore be developed) or take some entirely different form if the Soviet threat grew. They were right. The 1970 Posture Statement said:

"If, in the future, the defense of MINUTEMAN has to be expanded, new and smaller additional radars placed in MINUTEMAN field would be less costly than the SAFEGUARD Missile Site Radar (MSR) because they would not have to cover such large areas. For this reason, we will pursue a program to determine the optimum radar for such a defense and begin the development of this radar and associated components in FY 1971. At the same time, the Air Force will pursue several other options for solving the survivability problem of the land-based missile systems." (pg 49, prepared statement of Secretary Laird)

FAS COMMENDS PACKARD FOR "STRAIGHT TALK"

On October 21, Deputy Secretary of Defense David Packard spoke with remarkable candor on the arms race. At the time he spoke, a seemingly orchestrated chorus of alarm about the Soviet weapons buildup was reaching a peak. It included further leaks about big holes in the Soviet Union, a Life article about the Defense Department's preoccupation with the arms race, a five-part series in Aviation Week and Space Technology on the "growing threat", etc.

By contrast, Secretary Packard put the arms race in perspective. He noted that the President's goal of moving from an era of confrontation to an era of negotiation has

"really begun to be realized". He suggested that, on questions of SALT and arms race, there were hawks and doves in the Soviet Union as here. He noted that we sometimes misinterpret Soviet actions that are long underway as short term moves.

Secretary Packard argued that superiority was not very significant because "almost any conceivable nuclear exchange is going to be almost unliveable" for both countries. He suggested that the Soviet naval buildup was not related to Soviet interest in a confrontation with us. And he argued that patience and optimism were appropriate to the SALT talks.

Secretary Packard did not argue that the Soviets were seeking a "first-strike" capability but did say that if they were, we would "know it fairly soon" and that it would relate, in any case, to a period "several years off". Interestingly, Secretary Packard talked of the SS-9 buildup as becoming a matter of concern if the Soviets reached between 500 and 600 SS-9's — rather than the 420 of which the Defense Department had spoken at the time of the 1969 SAFEGUARD debate.

So long as Polaris is agreed to be highly invulnerable, many FAS specialists believe the "first-strike" notions are simply a rhetorically exaggerated way of discussing the problem of the vulnerability of Minuteman. But, for the rest, these statements of Secretary Packard's were in high agreement with FAS views and they came at a most useful time. FAS Chairman Marvin L. Goldberger wrote the Secretary and suggested that the Secretary's comments had enhanced his reputation for straight talk.

FAS GROWING — BUT NEEDS HELP

The growing effectiveness of FAS is matched only by the increasing attacks upon it. Not only the largest — but virtually the only lobbying arm of science — FAS needs more scientists who want to keep science relevant.

Find us new members. Send us names of persons to solicit. Post our material on bulletin boards. And if you can afford it, send us an additional donation; then we can locate new members through mail solicitation. For each \$10 you send us, we can locate a new member. Help us get the 1,000 new members we need.

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