

The Future Role of United States' Nuclear Weapons

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Marvin Miller

Introduction

This summary highlights the major themes raised by conference participants over the course of the two days of discussion. Primary emphasis is given to the three topics around which the conference was organized: 1) the future of US nuclear weapons, 2) the amount of nuclear capability the US should retain, and 3) the prospects and potential impact of a Comprehensive Test Ban.

Session I. The Future Role of US Nuclear Weapons

The first session focused on the future role for US nuclear weapons -- for what purposes and under what circumstances should the US use or threaten the use of nuclear weapons. The speakers were Ashton Carter, Roger Speed, and Ted Taylor. The discussants were Richard Garwin and Barry Posen.

All the participants agreed that a review of US nuclear policy is badly needed. Today's forces and institutions were built for a threat that no longer exists. Yet despite the objective changes in the security environment, past policy continues to define current choices and agendas.¹ The collapse of the Soviet Union has made it possible, however, to consider a broader spectrum of policy choices. Some analysts have advocated the development of "mini" or "micro" nuclear weapons that could be used in regional conflicts or in support of counter-proliferation, e.g., as the warhead for an anti-ballistic missile defense system or for penetrating and destroying underground bunkers.² Others are seriously reexamining the concept of abolition and a nuclear "free" world -- something that would have been considered outlandish only a few years ago.

In this session, discussion tended to revolve around three possible strategies. One would seek to de-emphasize and de-legitimize nuclear weapons. Such a policy would retain a secure second strike capability for the purposes of deterring a nuclear attack, but stress the use of conventional weapons. second strategy argues for continued (or even expanded) reliance on nuclear weapons. It recommends that the US maintain the legitimacy

¹ For its part, the Department of Defense recently began a nuclear posture review. The reassessment is motivated by a number of factors. The Department needs to be able to respond to new security Threats, but it also has to provide the bureaucracy with a clearly defined mission and give budget cutters some rationale on which to base their decisions.

² Participants from the US government were skeptical about the likelihood of new mini or micro nuclear weapons. Participants from the labs stated that engineering development work on such weapons was not being conducted. Others maintained that the military would refuse to use a weapon unless it had been tested, and the current testing moratorium (and possible CTB) made that an unlikely occurrence. It was also pointed out that Congress legislated a ban on the development of nuclear weapons with yields under 5kt.

of its nuclear arsenal and minimize constraints on America's ability to use it, e.g., avoiding a declaratory policy of "no first use." A third strategy argues that both the "deemphasis" and "continued reliance" policies are dangerous and immoral. It calls for abolition of nuclear weapons as the only way to prevent the outbreak of nuclear conflict.³ Each of the three strategies had its proponents and critics, as the following summary describes.

De-emphasizing and De-legitimizing Nuclear Weapons

Participants favoring a strategy of de-emphasizing nuclear weapons pointed out that the US has already begun to reduce its dependence on nuclear weapons. With the fall of the Soviet Union, American nuclear forces are being dramatically reduced. In addition, the United States has, as one participant put it, "gotten out of the testing business." These changes have been accomplished without damage to US interests or the US deterrent posture.

One reason the US can afford to reduce its reliance on nuclear weapons, advocates say, is that the stockpile of nuclear weapons was too large to begin with. America simply built more nuclear weapons than it needed. Some participants described what they saw as a tendency to try to find a nuclear answer to every problem, even when it was unwarranted. Take for example, the issue of Minuteman vulnerability. A remedy did not require building more nuclear weapons, but alternatives were largely ignored because policymakers were focused on finding an answer that made use of nuclear weapons. Throughout the Cold War, the US could have adopted any number of tactics or technical fixes that would have reduced the number of warheads needed in stock, but failed to do so. To reduce our reliance on nuclear weapons now, the argument goes, is an appropriate step after 50 years of excess.

Another reason for reduced reliance on nuclear weapons, it was argued, is their limited political and military utility. Nuclear weapons are comparatively crude policy instruments. Aside from deterring a nuclear attack on the US homeland or US "assets" in the field, there is little that nuclear weapons can do to protect or advance American interests. This is particularly true, proponents say, given the type of threats the US will be facing in the post-Cold War era -- regional conflicts involving small or medium powers. As the historical record shows, nuclear weapons

³ A fourth strategy, nuclear superiority, was acknowledged as a possible strategy, but it received only passing consideration by the participants. Few conference participants defended a strict abolition strategy, but some offered a sympathetic alternative, namely international management of nuclear weapons, and in one case, a proposed United Nations nuclear force that could offer nuclear security guarantees offered to states that maintain their nuclear abstinence.

have not deterred attacks on US regional interests, whether in Vietnam or the Persian Gulf. Moreover, they would be all but impossible to use without widespread collateral damage and devastating political consequences. Given this situation, nuclear threats against non-nuclear states are simply not credible and therefore, serve no useful deterrent purpose.

Still another reason to reduce reliance on nuclear weapons, a speaker suggested, is that they are not militarily necessary. Advanced conventional weapons provide the US with all the lethality and flexibility it needs for a wide variety of missions, including deterrence or retaliation against chemical weapons. Indeed, advanced conventional weapons provide the basis for a more credible threat than does their nuclear equivalent.

The low utility of nuclear weapons and the comparative superiority of American conventional weapons suggests a two part policy: 1) maintaining a secure second strike to deter a nuclear attack on the US, and 2) participating in multilateral efforts to de-legitimize nuclear weapons and to prevent further proliferation. Actions that would de-legitimize nuclear weapons for everything but defensive deterrence include the adoption of a "no first use" doctrine, strong US leadership in support of the NPT and the international nonproliferation regime, and the use of positive and negative nuclear security guarantees. In particular, the US should publicly recommit itself or even extend the policy adopted by President Carter pledging the US not to use nuclear weapons against non-nuclear countries unallied with nuclear weapons states.

These policies to de-emphasize and de-legitimize nuclear weapons would be balanced with a robust conventional capability and participation in a collective security regime, the purpose of which would be to deter, contain, or combat global aggressors. American nuclear weapons also could provide an umbrella against nuclear attack for UN forces that are called upon to uphold international law.

Continued Reliance on Nuclear Weapons

Participants advocating a continued reliance on nuclear weapons contended that a robust deterrent posture requires a strong, visible commitment to nuclear weapons. De-emphasizing nuclear weapons, they argued, would weaken deterrence since it would encourage adversaries to believe that the US would not use nuclear weapons. In other words, a de-emphasis strategy lessens the credibility of deterrent threats.

Moreover, a deemphasis of nuclear weapons could, paradoxically, create new incentives for nuclear proliferation. As one speaker put it, the US runs an international nuclear program so others do not have to develop their own nuclear weapons. Deemphasis or delegitimization of the US arsenal could make our allies feel more insecure and thus more willing to develop an independent nuclear capability. They also suggested that nuclear weapons may be necessary for counter-proliferation. A nuclear weapon might be needed to destroy a rogue nation's nuclear facilities, to eliminate the leadership of that country, or as part of an American ABM or other defensive scheme.

The continued reliance strategy rejects the notion that the US should adopt "no first use" or other doctrines that might constrain the use of nuclear weapons by the US. One speaker, for example, questioned the impact of such declarations. He went on to suggest that decisions about the use of nuclear weapons can only be made during a conflict, not in peacetime. To limit US nuclear options now would only tie the hands of policymakers wrestling with a future crisis.

Critics of the continued reliance strategy countered that reliance on nuclear weapons, not deemphasis, will lead to further proliferation. The argument was not that US restraint encourages good behavior on the part of other countries, but rather that lack of restraint will encourage bad behavior and undermine other efforts to build a nonproliferation regime. They also suggested that a "first use" option against non-nuclear states would mark a reversal of US policy established under Carter and would signal a defection from commitments made under NPT. To change policy now would undermine US leadership on a number of important American foreign policy objectives and could have a profoundly negative impact on efforts to renew the NPT.

Abolition

While the strong deterrence strategy criticizes the de-emphasis strategy for going too far in reducing US reliance on nuclear weapons, advocates of an abolition strategy argue it does not go far enough. As one presenter put it, nuclear deterrence is simply immoral, an abominable evil that is tantamount to indiscriminate murder. The abolition strategy recommends "going to zero" as soon as possible. Only abolition, it is argued, together with the construction of a global nuclear taboo and strong technical and "societal" verification can prevent the use of nuclear weapons.⁴

⁴ The phrase "societal verification" has taken on several meanings. Some analysts use it to refer to a degree of societal openness (e.g., free press, unfettered opposition, civil liberties, etc.) that would have the effect of increasing the

Fissile material is too accessible and nonproliferation efforts are too limited to prevent the eventual spread of nuclear technology to all who want it, possibly even to terrorists. Proponents of abolition contend, therefore, that there are no half-way or band-aid solutions to the danger of nuclear weapons; only a complete ban on nuclear weapons can prevent a future catastrophe.

Critics of the abolition strategy contended that a nuclear free world is both unlikely and dangerous. The international system, they argued, is a world of nation-states, and nation-states are fond of nuclear weapons because they help countries with their security problems. It is unlikely, for example, that Russia will give up its nuclear weapons given the size of the Chinese conventional threat. Indeed, the only way Russia can balance against a billion Chinese is with nuclear weapons. What is true for Russia is no less true of the other nuclear weapons states that cling to their arsenals because of the security they provide.

Even if states did agree to get rid of their nuclear weapons, the critics responded, the result would be a more dangerous world. Conventional wars would increase in frequency, as would the chances of very large scale conventional conflict or World Wars. They also warned that abolition creates strong incentives for defection since it would provide marginal powers with a lower threshold for gaining status and leverage, i.e., a single warhead would command more respect in a world of abolition than it would today.

Session II. Future Nuclear Capabilities and the National Laboratories

The second session of the conference addressed the question, "how much nuclear weapons capability do we need to retain?" The speakers included Victor Reis of the Department of Energy, Ray Juzaitis and Philip Goldstone from the Los Alamos National Laboratory, and Paul Brown and Richard Fortner from the Lawrence Livermore National Laboratories. The discussants included two lab alumni, Carson Mark and Ray Kidder, and Gene Rochin.

Presentations

confidence of the international community that a state was not engaging in treaty violations or that if it was, it would soon become public knowledge. Other analysts believe that treaty verification regimes can be designed to explicitly encourage monitoring of treaty obligations by the relevant technical communities and by ordinary citizens.

Though individual presentations differed, the initial set of speakers all sounded a common theme: the national labs must continue to play an important role in protecting US security, and that doing so requires "a set of enhanced capabilities and facilities." These enhanced capabilities and facilities will enable the labs to pursue their new mission -- "stockpile stewardship."

Stockpile stewardship is a broad category that covers activities ranging from evaluation of components in stockpile weapons and their possible remanufacture to "virtual design" of new weapons. Its nominal goal is to ensure the safety and reliability of the current stockpile. Speakers pointed out that most of the weapons in the stockpile were designed, tested and certified during the late 1970s and early 1980s. Many of these weapons were optimized for performance, not endurance. With the current US moratorium on nuclear testing, and the prospect of a Comprehensive Test Ban Treaty in the near future, it is likely, the speakers suggested, that the US will have to maintain this particular stockpile for an indefinite period without recourse to testing, except perhaps at "zero-yield" (i.e., with a nuclear yield less than the chemical explosive yield of the implosion system). The loss of testing and the need to respond to the effects of aging require the construction of new facilities for the purpose of stockpile evaluation. Once built, such facilities would enable the labs to 1) guard against future problems in the stockpile, 2) investigate safety issues such as multi-point accidents and spontaneous detonation, and 3) evaluate new nuclear threats and the means to counter such them.

Maintaining such a capability requires highly competent staff, but the labs cannot retain key personnel and attract new talent without an experimentally-based program that provides the scientists and engineers with challenging technical problems and a critical mission. Attracting new talent will be even more important given a CTBT. Once the current cohort of weapons testers retires there will be nobody left who has experience with an actual test. Advanced facilities will be necessary to prevent "drift" and sloppiness in calculations that may emerge as personnel get further and further away from actual test experiences.

In order to meet stockpile stewardship's twin goals of insuring the safety and reliability of the current stockpile and maintaining a nuclear design capability, the speakers proposed the construction of a variety of new facilities. Most of the attention focused on above ground experiments (AGEX). There are two types:

AGEX I are advanced means of probing the implosion phase of a nuclear explosion (e.g., with the Dual-Axis Radioactive Hydrotest or DARHT facility) and AGEX II are facilities that simulate the conditions of high energy density that occur during the course of nuclear explosions (e.g., with the National Ignition Facility). Lab presenters contended that both types of facilities are needed to augment current facilities such as the Lawrence Livermore's Site 300.

In addition to the proposed new experimental facilities, the lab presenters advocated the construction of enhanced computational facilities for 3-D simulation, "virtual design" activities, and vigorous pursuit of whatever testing is permitted under new treaties, for example, so called "hydronuclear tests." (Presenters pointed out that current US legislation does not define what activities are permitted under the existing testing moratorium, and discussion to date by the Conference on Disarmament (CD) in Geneva on the terms of a CTBT has not considered the definition of a nuclear test.)

Discussion

While the speakers shared a common belief in stockpile stewardship and the need for maintaining adequate diagnostic and computational facilities, the designated discussants and some participants were skeptical of the labs' proposals. One discussant maintained that the proposed facilities would be prohibitively expensive. Another questioned why the US needed these facilities to maintain a credible threat when countries like Israel and Pakistan had credible arsenals without them. Still others suggested that the link between the problems to be solved and the new capabilities to be attained was tenuous. Would three dimensional modeling of weapons, for example, really help us understand the possibility of nuclear criticality in a hypothetical accident scenario involving the Trident missile?

Overall, the objections to the lab presentations focused on three main points. The first point was that the nuclear stockpile is already safe and reliable and likely to remain so for some time. According to one discussant, a review of recent nuclear tests shows that predictions of yield based on calculations were virtually identical with results obtained through testing. The labs' contention that newer nuclear weapons are more unreliable and dangerous than earlier ones is simply implausible. As the labs' own data shows, we have learned more and more about nuclear weapons even as the number of tests has been decreasing. The few times predicted yields deviated significantly from test results

were anomalies, not the rule, and were in most instances anticipated by the results of nonnuclear tests or because of the radical nature of the design being tested.

Even if concern about the stockpile's reliability was warranted, new facilities would not be needed. One can evaluate almost every element of weapons in the stockpile without nuclear testing. Moreover, policymakers can adopt any number of non-testing regimes that can bolster the credibility of the arsenal, e.g., replacing the tritium more frequently. In sum, the stockpile has been safe and reliable, and there is no reason to believe that the situation is any different today than it was a few short years ago.

The second major point made by the discussants concerned the purpose of future nuclear weapons in a post-Cold War context. In the past, the US required a level of confidence commensurate with using nuclear weapons for war-fighting against a highly sophisticated adversary. With the collapse of the Soviet Union, that threat no longer exists. Today, the purpose of US nuclear weapons is not clear. We do not need, however, a Cold War level of assurance for such post-Cold War threats as deterring a rogue state, these opponents argued. Even if the calculations about the yield, e.g., gamma rays from a nuclear explosion, are off by an order of magnitude, it is unlikely to affect the credibility of our deterrent posture. What the labs have failed to do, they argued, is show how potential problems with reliability affect our ability to deter potential adversaries.

A final point offered by those skeptical of the need for new facilities concerned remanufacture. They suggested that the issue of safety and reliability is an engineering issue, not a science issue. Aging and other related problems can be avoided by simply remanufacturing suspect components of old nuclear weapons. While some lab presenters acknowledged that remanufacture was likely to be the primary strategy of the future, others insisted that remanufacture alone was insufficient. Remanufacture without new kinds of testing would result in drift, sloppiness, and a loss of confidence.

In the end, the discussants concluded that the labs did not need an active test organization, and that they can respond to new needs based on current capabilities. Whatever additional data might be needed for emerging threats can be obtained once the threat is evident. Until then, a small weapons establishment can employ a variety of strategies to maintain the capabilities of lab personnel without extensive new facilities.

Session III. Comprehensive Test Ban

The third session of the conference focused to issues associated the Comprehensive Test Ban (CTB) now under negotiation in the CD in Geneva. In earlier sessions, the CTB had been raised both as an aspect of nonproliferation policy and as a rationale for new above-ground testing facilities. In this session, participants discussed the history of the CTB, its current prospects, the European view, and the technical impact of the CTB. The speakers included Surgeon Keeney, Robert Bell, William Quirk, and David Yost. Pierce Corden and Paul Doty were designated discussants.

Presentations

Historical Overview

The session started with a short history of the CTB -- the ups and downs from Eisenhower to Carter, and the ways in which both domestic politics and the international environment influenced the outcome of events. Eisenhower had an initial interest in the CTB, but the combination of Congressional politics, Soviet reluctance, and the U2 incident stymied any hope of a treaty. Under Kennedy, the negotiation of a partial test ban following the Cuban missile crisis reduced the urgency for a CTB. Nixon's interest was on other issues, most notably SALT, but Carter earnestly pursued a CTB and managed to get 90% of the issues settled early in the negotiations. The few remaining issues involved questions such as peaceful nuclear explosions and the duration of the treaty. Prospects for a CTB under Carter began to suffer, however, from domestic opposition and a deterioration in US-Soviet relations; the negotiations eventually collapsed after the Soviet invasion of Afghanistan. Both Reagan and Bush opposed the CTB, but under the Clinton Administration, a CTB is a priority item on the non-proliferation agenda.

Current Prospects

The current prospects for a CTB was the next item on the agenda. The speaker described how the Clinton administration had conducted a six month review of testing policy, endorsed a cessation of testing, and was now at the point of producing presidential directives and setting agency budgets in accordance with the new policy.

The speaker suggested that while the US government is now ready to push on the CTB, the negotiations will be difficult. The major obstacle will be France. While the US has completed its modernization testing program, France will be in the midst of a

modernization cycle at the time of the NPT renewal conference next May. Thus, the French nuclear establishment will likely oppose the treaty. However French President Mitterand strongly opposes a renewal of testing, as does a majority of the French public. China is another potential stumbling block, but the Chinese have publicly accepted a September, 1996 deadline for ending their nuclear testing program and completing negotiations on CTB.

Many factors will affect the course of negotiations. These include: the duration of the treaty, its scope (i.e., what constitutes a nuclear test), its linkage to a policy of "no first use," and defining the number of states required for the treaty to come into force. Despite the difficulty of these issues, there is a reasonable chance that a CTB can be successfully negotiated. The view expressed by the speaker was one of cautious optimism about getting a treaty by the September, 1996 deadline.

A European Perspective

While earlier discussion emphasized a US perspective, this part of the session was devoted to the European view of CTB. The speaker, an American and a long time student of defense issues in the UK and France observed that neither country is enthusiastic. As one European commentator noted, "if it fails to pass, there will be no profound disappointment." In the end, the speaker believed, the UK will go along with the US. (It has little choice since the UK tests its weapons at the Nevada test site.) The French, however, are likely to put up a fight. This is due, in part, to France's national self image as a Great Power and in part, a function of France's domestic politics.⁵ As noted above, Mitterand has single-handedly prevented testing, and his departure may bring a change of view. Opponents of a treaty can be expected to try to slow the pace of negotiations, insist on a large number of country signatures before the treaty becomes operative, and attempt to de-couple the CTB from NPT.

Technical Impact of a CTB

The next presentation examined the likely technical impact of the CTB. More specifically, it addressed to what extent a CTB would retard a would-be proliferant's effort to build a credible nuclear arsenal. Not surprisingly, the impact of a CTB varies depending on two factors. One is the state's level of scientific development and access to test data. The other factor is the level of

⁵ French opposition also reflects a different view of nuclear weapons. The French reject, for example, the notion that nuclear weapons should be de-legitimized. Such de-legitimation, they argue, would only effect the West, leaving it vulnerable.

sophistication demanded by the weapon type. In general, the more sophisticated the weapon, the greater the need for testing. The following chart summarizes the speaker's estimate of the need for testing as a function of weapon type.

Design Type	Typical Yield (kt)	Difficulty w/o Testing
<u>Pure Fission</u>		
Gun assembled	5 to 15	Very low
Solid pack	5 to 20	Low
Levitated pit	5 to 20	Low to moderate
<u>Advanced</u>		
Staged thermonuclear	250	High
Staged thermonuclear w/ boosted primary	250	Very high
Optimized staged Thermonuclear	250	Extremely high

As indicated, even without testing all pure fission weapons can be stockpiled with confidence. Moreover, a conservatively designed thermonuclear might present a credible threat, even without a nuclear test.

Discussion

The discussants had a variety of responses to the four presentations on the CTB. Most of their remarks, however, concentrated on three key points. The first was that there is reason to be more optimistic about the fate of a CTB than is commonly assumed. The CTB has a lot of political momentum that may prove difficult to reverse. Indeed, history shows that these issues tend to develop a political life of its own. The UK may want to continue testing, but they cannot do so without the US. France will be more recalcitrant, but there is reason to believe that, in time, the French will come on board. To begin with, if the moratorium continues, it will be increasingly difficult for France to violate it. Second, it will be very expensive for them to test. In a few years, even without Mitterand, French testing may end simply because of the cost. Over time, the combination of a steady US policy and building momentum should bring about a CTB.

A second point concerned what was seen as a contradiction in lab arguments over the value of testing. On the one hand, it was

argued that new testing facilities are critical to maintaining a credible and reliable nuclear force (Session II). On the other hand, it was argued that other countries can build credible nuclear arsenals without testing (Session III). Why is it the case, one discussant asked, that Germany could build reliable nuclear weapons without testing but not the US?

The third major point of discussion concerned whether it is important for a CTB to define a nuclear test. Should it, for example, prohibit so-called "zero yield" tests or hydronuclear tests? The consensus among the discussants and the participants was a CTB without a definition is better than no CTB at all. Given the probability that the parties will be unable to agree on a definition, practicality dictates that the treaty remain silent on this issue. This, indeed, is the way things appear to be going in the CD. It should be noted, however, that including hydronuclear tests within the scope of the CTB does not require definition of a nuclear test, but merely a careful description of the experimental activities to be banned.

Conclusion with McGeorge Bundy

In 1949, McGeorge Bundy was working for Secretary of State Dean Acheson. At the time, most people believed that war was inevitable, and that nuclear weapons would be used. It was a given. The difference between then and now is striking, and these differences were the focus of Bundy's remarks. He voiced the view that everything has changed, from the disappearance of the Fulda Gap (and thus the need for a "first use" policy) to the way people think and talk about nuclear weapons the world over.

One of the differences between the early years of the atomic age and today is that the debate over the future of nuclear weapons is much less divisive. Particularly impressive is the new sentiment in the labs. For the first time, he suggested, it is now possible to start from the general proposition that the US is not planning to use nuclear weapons. Moreover, the military is no longer interested in new and better ways to fight a nuclear war. Take, for example, the changed attitude in the Navy. With the exception of the submariners, there is great relief in the naval forces over disarmament. Nuclear weapons proved to be an operational burden, the consequence of which was the loss of some of the Navy's best officers whose careers prematurely ended after having failed some minor safety test. The Navy has concluded that the weapons were not worth it.

Another difference can be found in the way people now define the appropriate use of nuclear weapons. The fact that people think of nuclear weapons in terms of deterrence rather than war fighting is, itself, progress. These changes are incomplete and continue to unfold. Steady progress is not inevitable, however. Some nations, Israel and France to name two, view nuclear weapons in different terms. Yet, there is an emerging recognition that use of nuclear weapons is in no one's interest.