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The Future of Nuclear Weapons: The Next Three Decades

Conference Summary

Patrick J. Garrity
Robert E. Pendley
Robert W. Selden

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Center for National Security Studies
Los Alamos National Laboratory

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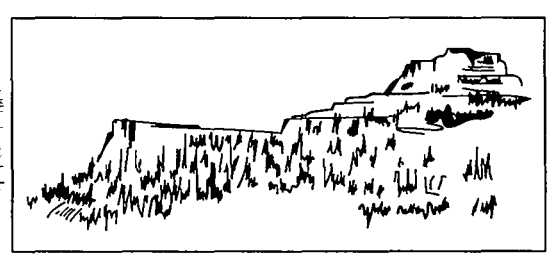

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PATRICK J. GARRITY, a Staff Member in the Center for National Security Studies, holds a Ph.D. in government (international relations specialty) from Claremont Graduate School. He is currently aiding in the completion of the Center's Future of Nuclear Weapons study. He is also participating in the Center's work on U.S. space policy, which focuses on possible future technical requirements for space monitoring and arms control verification.

ROBERT E. PENDLEY is a Deputy Center Director of the Center for National Security Studies. He has worked in the areas of security policy, and arms control and verification. Dr. Pendley holds a Ph.D. in political science from Northwestern University.

ROBERT W. SELDEN is the Director of the Center for National Security Studies. He has previously managed the Applied Theoretical Physics Division at Los Alamos and has served as Associate Director for Theoretical and Computational Physics. Dr. Selden holds a Ph.D. in physics from the University of Wisconsin.

THE FUTURE OF NUCLEAR WEAPONS: THE NEXT THREE DECADES

Conference Summary

Patrick J. Garrity, Robert E. Pendley, and Robert W. Selden

PREFACE

This paper is an overview of the conference on *The Future of Nuclear Weapons: The Next Three Decades* held at Los Alamos, June 6-8, 1988, and sponsored by the Center for National Security Studies of the Los Alamos National Laboratory. The conference was one of the principal products of a three-year study by the Center. The future of nuclear weapons was addressed in three broad areas—policy and politics, technology, and military perspectives. Conference speakers identified and discussed the key issues and driving forces that will shape the future of nuclear weapons over the next three decades, taking both retrospective and prospective views, but not trying to predict the future.

ABSTRACT

An overview is presented of a conference held at the Los Alamos National Laboratory, June 6-8, 1988, on *The Future of Nuclear Weapons: The Next Three Decades.* The conference was sponsored by the Laboratory's Center for National Security Studies.

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THE FUTURE OF NUCLEAR WEAPONS: THE NEXT THREE DECADES

Conference Summary

by

Patrick J. Garrity, Robert E. Pendley, and Robert W. Selden

INTRODUCTION

During the first week of June 1988, the Center for National Security Studies of the Los Alamos National Laboratory sponsored a conference on *The Future of Nuclear Weapons: The Next Three Decades* (the conference program is given on page 10). One hundred and fifty persons from the DOE laboratories, government, military services, academia, and industry gathered in Los Alamos for three days to discuss this topic from the perspectives of policy and politics, technology, and military considerations. The conference speakers were asked to consider in retrospect the development of the present roles of nuclear weapons and then to look ahead over a nominal thirty-year period, which would extend well beyond normal planning horizons. In selecting such a long-term view, the intent of the Center was not to ask for predictions; rather, the intent was to challenge the participants to think about the key issues and driving factors that will shape the long-term future of nuclear weapons.

This challenge, aimed at developing better insight and understanding about the future of nuclear weapons, was focused by two sets of critical questions:

> What future roles will nuclear weapons play in U.S. national security policy? Will they resemble the fundamental roles of past decades, or are we moving into a different era?
>
> What are the potential changes in the political, technical, and military environments that might, singularly or cumulatively, bring about significant shifts in U.S. nuclear weapons systems and deployments?

The conference did not provide conclusive answers to these provocative questions. Indeed, in speaking with a number of participants after the conference, we have been impressed with the variety of ideas and impressions that individuals took away from the conference. Some of the arguments presented by the speakers and the panel sessions were controversial. Such controversy was expected and encouraged: the conference was designed to force all of us to think through our basic assumptions about nuclear weapons and their likely roles in the next century.

SUMMARY OBSERVATIONS

A few principal themes emerged from the presentations, comments, and lively exchanges of ideas. We have summarized three of the most important below.

The roles of nuclear weapons will probably evolve substantially over the next three decades, although nuclear weapons are here to stay in some form and in some numbers.

The conference discussion pointed toward future arms control agreements and unilateral U.S. national security policy decisions that will most likely lead to significant numerical reductions in the nuclear stockpile. Beyond this, certain types of nuclear systems, especially those with tactical missions, could be greatly reduced or even phased out. Most participants agreed, however, that the United States will continue to rely on nuclear weapons to deter major hostile actions by the Soviet Union, and possibly by other states that may themselves possess nuclear (or chemical and biological) arms.

Nuclear weapons strategy is likely to move toward a "deterrence-only" policy that will place less emphasis on counterforce targeting and warfighting capabilities.

The sense of the conference, although by no means unanimous, was that the reductions in numbers of nuclear weapons and the continuing emphasis and progress in arms control would result in this kind of a long-range trend in U.S. nuclear strategy. This change will almost certainly not occur within the immediate future, if for no other reason than the decades-long investment that has been made will take considerable time to draw down. However, some conference participants argued that the United States should actively begin to change its force structure to reach a deterrence-only posture as a positive means of retaining public support of nuclear weapons and deterrence over the long term.

There is an obvious tension between the policy and force-structure trends discussed above and the need for excellence in the nuclear weapons technology base during this time of change.

Public and political support of the nuclear weapons research and development program have fluctuated over time, but many see increasing political pressures to limit the program—especially nuclear testing. These limits are argued to be consonant with overall reductions in nuclear weapons, and even to prevent the development of new capabilities. On the other side, conference participants cited (1) the increased need for technical excellence as the numbers of weapons are reduced and (2) the increased need to avoid technical surprise. This will be a challenging time for the community responsible for maintaining weapons technology.

The sections that follow summarize the principal topics covered in the respective conference sessions. We have attempted to restate the key points of the various panels and, equally important, to identify the issues that were not fully developed so they can be explored further. In offering this summary, we repeat that the conference was intended to identify long-term issues and trends, not to offer definitive predictions; and that the conference focused on the next thirty years, not on the likely policies of the new administration.

POLITICAL INFLUENCES ON THE FUTURE OF NUCLEAR WEAPONS

Professor Joseph Nye of Harvard University, former Deputy to the Under Secretary of State for Security Assistance, chaired the sessions on policy perspectives. Four significant drivers of future U.S. nuclear requirements were identified during the day's sessions:

- the long-term effects of General Secretary Gorbachev's reform program of perestroika on Soviet military doctrine and on U.S. perceptions of the Soviet military threat

- an international environment that is increasingly multipolar in political, military, and economic terms

- the importance of arms control in U.S. national security policy
- the limits that U.S. and other free world public opinion may place on nuclear policy

The Soviet Military Threat

Any significant perceived change in the quantity or quality of the Soviet military threat has historically had a critical impact on U.S. nuclear doctrine and weapons development. There was a consensus among the speakers that, in the near to mid-term, Gorbachev will attempt to gain a breathing space in the strategic competition with the West to free resources for his economic restructuring program. To the extent that he is successful in maintaining this domestic focus, the Western perception of the Soviet threat will undoubtedly decline—with a predictable decline in the U.S. defense budget and nuclear weapons programs.

But will the threat really decline and will Soviet leaders actually move toward a military doctrine (as they have promised) based on "reasonable sufficiency" and defensive emphasis? The uncertainties here are many, if for no other reason than the Soviets, even if sincere, will retain for many years a force structure that was developed and procured under a preemptive, offensive strategy.

We do not have a set of key indicators that will provide solid evidence of any significant shift, or lack thereof, in the Soviet military posture.

Even more uncertain is the long-term prospect for the success of perestroika and the impact of a variety of conceivable outcomes on Soviet foreign and military policy. We do not understand the relationship between Soviet capabilities and Soviet "impulses." Would Soviet weakness, for instance, lead to international adventurism or retreat? Would the success of domestic economic and social restructuring result in greater Soviet maturity or bellicosity? If the conference discussion provides any indication of the U.S. judgment about these questions, the United States will probably operate, at least in the near to mid-term, on the assumption that the Soviet political-military threat will decline.

The Changing International Environment

By 2020 various nations, including Japan, China, and several Western European nations will command substantially more economic and political power than they do today. American nuclear deterrence policy has traditionally focused on ensuring the independence of these three centers of power, which have been to a greater or lesser degree incapable of fully defending themselves. How will the U.S. relationship with its major allies be affected, and how will the corresponding nuclear requirements change, as these nations become much more powerful relative to the United States and the Soviet Union?

Conference participants emphasized that the U.S. military alliance structure—including the American nuclear guarantee—is almost certain to devolve in significant respects over the next thirty years. The most important possible development would involve a fundamental change in the U.S.-West European relationship, whereby American nuclear forces cease to be the central political and military element in NATO strategy. This might be brought about by unilateral American decision, the preference of more nationalist European governments (of the right or the left), the creation of a European defense organization with its own independent nuclear force, or, in an extreme case the West German acquisition of nuclear weapons.

In East Asia the nations of Japan, China, and perhaps Korea have the potential to become regional military powers with strategic ambitions that may not coincide with the interests of each other, or with the interests of the United States. It is possible, and some would argue that it is likely, that our nuclear policies in East Asia will follow a similar course to those in Western

Europe. Significant changes will occur as these countries gain in military and economic strength, with the most extreme case being that of Japan acquiring nuclear weapons.

Below this first tier of rising nations is a second tier—for example, Iran, Taiwan, Indonesia, and India—that may also develop impressive military capabilities and ambitions, possibly clashing with other powers for regional domination or with the United States or the USSR. At first glance, U.S. nuclear weapons do not seem to be directly relevant in local military operations that might involve these second-tier states. However, conference participants actively debated the thesis that U.S. nuclear forces do today, and will in the future, offer support to U.S. regional actions, for instance, the current Persian Gulf operations. Another thesis suggested that U.S. nuclear forces will continue to mark the United States as the only true economic, political, and military superpower, thus distinguishing it from all other states even thirty years from now.

The U.S. policy toward this multipolar world will be complicated immensely by the likelihood that at least some of the second-tier states may attempt to acquire nuclear weapons. We already have evidence that "proliferation" is taking place in these areas, in the form of ballistic missile technologies and in submarine capabilities. These (and the spread of other major military systems) will pose increasingly difficult problems for U.S. foreign and defense policies and for the continuation of a policy of extended deterrence as we have known it for the past several decades.

Arms Control

There was some consensus that a START agreement would be reached within the next several years, but that additional strategic arms control agreements would not follow for some period because of the time necessary to implement and digest START. The arms control focus may then shift to conventional arms control during this period.

For the long-term future, the case was made—not without opposition—that the arms control process would most likely support, and possibly drive, the shift toward a deterrence-only nuclear posture. If this view is correct, future arms control policy will be aimed at restructuring nuclear forces to a retaliatory deterrent role alone, accompanied by a shift to forces designed to be stable above all, even at the sacrifice of attributes useful for current types of military missions. The shift will arguably occur in part by design (it has been an objective of U.S. arms control policy for decades) and partly by the force of technological change (the growing capabilities of nonnuclear weapons and defensive systems) and changing global circumstances (the shift from a bipolar to a multipolar world). Over this period, negotiations will have to include all important nuclear powers: at least France, the United Kingdom, and the People's Republic of China.

There was strong agreement across the political spectrum at the conference that arms control, like nuclear weapons, is here to stay. Differences did emerge, however, concerning the rate at which substantial nuclear reductions might take place (decades or much sooner?) and over factors that might cause the arms control process to take a significantly different and considerably faster path.

Public Opinion, Political Culture, and the "Delegitimization" of Nuclear Weapons

Several conference participants offered the judgment that Western public opinion has not reached the breaking point with respect to support for nuclear deterrence and nuclear weapons development. They argued that the anti-nuclear sentiments of the early 1980s represented a cyclical and not a secular phenomenon: opposition to nuclear weapons tends to rise and ebb according to public perceptions of the danger of nuclear war, the danger of Soviet aggression, and the adequacy of the government's response to those dangers. Further, the notion of public opposition needs to be examined closer—effective political resistance to reliance on nuclear deterrence and nuclear modernization is actually generated by elites (especially governing elites—legislators and public officials) who oppose current policies, and not by a true grass-roots movement.

Perhaps surprising to some at the conference, analysis of public opinion data indicates that publics in the U.S. and in key European NATO countries continue to support the basic concept of deterring wars with nuclear forces. The U.S. populace moved in the 1950s from a reaction of abhorrence at the thought of nuclear holocaust to an acceptance of the notion of international stability through mutual deterrence. That acceptance continues today. But it is also true that publics do not want to hear about concepts of nuclear warfighting. While such concepts are perhaps necessary at the operational level for actual implementation of a deterrent posture, open discussions using these rationales for nuclear forces can erode continued public support for a strategic policy based on deterrence.

Looking ahead thirty years, there is no necessary reason why Western publics would not continue to support nuclear weapons, if governments made the proper case for deterrence. There was disagreement among the participants, however, over what constituted a proper public case for nuclear weapons. The Future of Nuclear Weapons study of the Center will need to take a closer look at this point, especially to determine those circumstances that might lead to a significant and permanent shift in the public perception of nuclear weapons, to the extreme of a failure of support for a national security policy based on any level of nuclear deterrence.

TECHNOLOGICAL INFLUENCES ON THE FUTURE OF NUCLEAR WEAPONS

Dr. John S. Foster, currently Vice President of TRW, former Director of Lawrence Livermore National Laboratory and Director of Defense Research and Engineering, chaired the session on technology perspectives. These presentations focused on the history and future of nuclear weapons technology and general defense technologies. They were intended to describe potential areas of substantial technological evolution in nuclear weapons, delivery systems, guidance, conventional munitions, command and control networks, sensors, and computer processing and to identify the potential impact of that evolution on defense capability and policy.

Nuclear Systems

Nuclear weapons technology has historically evolved through several significant changes that have led to the deployment of today's systems of land and sea launched intercontinental ballistic missiles, bombers, air and sea launched long-range cruise missiles, and a variety of theater and tactical systems. The related areas of safety, security, and control technologies have also had a significant impact, and the future is likely to bring dramatic advances in automated, selective remote control, and autonomous security operation.

Major, potential future nuclear design changes cited at the conference were in the areas of strategic earth penetrating warheads, the broad category of directed energy systems, and tailored output devices. Such advances in nuclear design were described as helping address the problem created by the growing inability of the United States to hold critical Soviet-Warsaw Pact military targets at risk—especially in the categories of hardened, deeply buried shelters; mobile weapon systems; and strategic defense. The participants generally did not address the impact on nuclear weapons of changes in military technology in propulsion systems, sensors, stealth, and the like.

An important note here is that the technology changes forecast as a rule appear to be contrary to the previously identified policy trends toward a deterrence-only nuclear strategy, which backs away from counterforce and warfighting capabilities.

Nonnuclear Systems

The conference participants were presented with a broad spectrum of possible advances in technologies relevant to nonnuclear military operations in space, in the air, on land, and at sea.

Many of the advances may be dramatic, especially those in the areas of propulsion, automation, sensors, guidance and control, C^3I, stealth, and protection and countermeasures. The trend is clearly toward standoff weapons with autonomy, long range, high accuracy, and high lethality; toward C^3I systems with long-range, accurate all-weather capabilities; and toward computer-assisted decision-making for both manned and autonomous systems and command centers.

These changes, over time, will revolutionize the conventional battlefield. (It may be more accurate to say that they are already beginning to revolutionize it.) These changes, involving not just one single breakthrough but the steady development of many advanced technologies, may also make it possible to substitute certain conventional weapons for missions that are currently assigned to nuclear weapons.

Zero-CEP nonnuclear systems may allow the selective destruction of critical functional nodes within a target complex, assuming that those nodes can be properly identified. The technical problems associated with employing long-range conventional systems effectively on mobile targets may, however, remain intractable for decades. And the strategic deterrent role of nuclear weapons seems very unlikely to be challenged by conventional technology.

Advanced nonnuclear weapon capabilities will continue to increase around the world, even in third world countries. These changes will increase the difficulty of maintaining stability against hostilities ranging from terrorism to major regional conflicts, and will provide a significant challenge to both major alliances over the coming decades.

Strategic Defense Initiative

Stategic defenses were not discussed extensively at the conference, which in itself is significant because the Strategic Defense Initiative was initially proposed to change dramatically the future roles of nuclear weapons. From the discussion that did occur, it is fair to summarize the general consensus (with a few dissenters) that if strategic defenses are deployed over the next several decades, they will probably not themselves play the leading role in the long-term evolution of U.S. nuclear policy and forces. Rather, any defenses are likely to be limited and would be intended to enhance offense-based nuclear deterrence.

Defense Technology Base

The participants universally recognized the decline of the U.S. defense technology base and advocated vigorous research and development programs; however, there was no systematic attempt to consider any possible institutional reforms of the defense R&D community or to indicate overall resource priorities that might be exercised so as to protect U.S. technical options (including nuclear) over the next thirty years.

Nuclear Testing

The increasing domestic and international political pressures directed at achieving more stringent, and possibly comprehensive, restrictions on nuclear testing were discussed. There was general agreement (although not unanimous) that such restrictions would have serious consequences for the ability of the nuclear weapons laboratories to maintain nuclear competence and thus their ability to continue to play the key role in deterrence that it was agreed they historically and currently play. This problem would become even more serious if such attempts to control technology were also to be extended, unilaterally or through negotiated agreement, to other parts of the U.S. research and development community.

[redacted]

ventional role, both for strategic and tactical missions.

The Navy will probably continue to support the deployment of SLBM forces, but will tend to resist and decrease other nuclear roles that interfere with "normal" fleet operations, for instance, nuclear SLCMs for strategic or tactical land-attack roles and tactical nuclear weapons for use at sea. The future nuclear role of naval aircraft is also uncertain.

The Army is not likely to change its view of nuclear weapons over the next several decades. They anticipate a decrease in the number of stockpiled nuclear weapons and would likely support significant increases in military effects at the same or lower levels of collateral damage. The need will likely increase for options for ballistic and cruise missiles launched from dual-capable artillery systems, as will the need for air-carried theater nuclear systems.

The discussions in this session begged a military/technical question that seems to be at the heart of our current strategic uncertainty about nuclear weapons: the future role of counterforce/damage limitation, which has been the cornerstone of U.S. operational nuclear strategy. We have already noted the long-term political trends that work against a continuation of the counterforce mission, but there are also legitimate technical reasons to question the viability of existing strategic nuclear policy. Because Soviet nuclear forces are becoming ever more difficult to locate and destroy promptly, even those individuals who are reluctant to move away from current nuclear strategy are increasingly inclined to consider "slow counterforce" and "no counterforce" targeting.

Any move away from counterforce targeting, whether mandated by political or technical pressures, would represent a significant shift in military emphasis for nuclear weapons over the following decades. In this case, would the United States be forced to emphasize nuclear roles and requirements based solely on urban-industrial attacks, as would be stressed under a

deterrence-only approach? Or are there other military missions—for instance, targeting general purpose forces, command and control—that might allow the continuation of a flexible response/countervailing strategy similar to that in existence today? To further complicate the issue, we would also observe that, although strategically effective counterforce/damage limitation operations do not appear technically feasible for either side in the foreseeable future (5-15 years), that judgment may not hold over the thirty-year period of this study.

OTHER COMMENTS ON FUTURE NUCLEAR ROLES AND MISSIONS

The trends discussed above suggest that over the next thirty years certain strategic roles and military missions for nuclear weapons may be approached quite differently than they are today. In the view of several conference participants, if an overarching deterrence-only approach to U.S. nuclear policy does emerge over the long term (in contrast to the present *countervailing* strategy), such a policy would stress survivability over weapons effectiveness and a strictly retaliatory posture over the ability to execute and maintain control over nuclear operations at all levels of conflict (*flexible response*).

Two possible elaborations to the deterrence-only approach were discussed at the conference. The first was termed *mixed deterrence*. Under such a doctrine, the United States would retain small numbers of survivable, sea-based nuclear weapons to deter attack against its homeland by threatening the urban-industrial targets of the Soviet Union and other hostile nuclear powers. Advanced conventional systems would then be substituted for the strategic military missions formerly assigned to nuclear weapons.

A second proposed deterrence-only approach was termed *countercombatant targeting*. Like the mixed deterrent strategy, it would reduce the strategic nuclear force mission to holding the enemy's urban-industrial base at risk. In this case, however, a limited number of discriminate nuclear weapons, deployed in or near the probable theaters of military operations, would be targeted against the enemy's conventional forces. These theater nuclear weapons would not be considered as warfighting tools: they would not be linked with the strategic forces under flexible response as is now the case, but would be intended primarily to complicate the enemy's military planning in the theater and thus decrease his incentive to attack.

Obviously, any such deterrent-only approach would raise serious questions for the so-called *extended deterrent* mission, whereby the United States commits (or reserves the right) to use its nuclear forces in defense of regional allies and vital overseas interests. But such questions have already emerged under existing doctrine and circumstances. The current U.S. approach to extended deterrence—flexible response—was formulated when the Soviet-American bipolar conflict dominated international politics and when U.S. allies were relatively much weaker. If the threat of aggression is reduced or becomes less Soviet-centered; or if the post-World War II pattern of U.S. overseas allies is significantly altered; or if conventional weapons become much more capable military instruments for certain regional defense problems; then U.S. nuclear doctrine, force structure, and operations may evolve in their own right, away from a flexible response capability.

We note here, without elaboration, other nuclear roles that might similarly be affected over the next three decades: the political "reassurance" that the U.S. nuclear guarantee has been intended to offer Western European and other allies; the role that nuclear weapons have played in bounding the problems of conventional forces in high-intensity conflict; and the strategic leverage that U.S. nuclear forces have exerted over Soviet military force planning and resource allocation.

Significantly, with respect to possible change in the future American view of nuclear weapons, no one at the conference explored the conditions under which the role of nuclear weapons in U.S. national security policy and defense strategy might *increase*. When discussing the effects of and solutions to the declining defense budget, no one suggested a return to a policy of massive retaliation, which the Eisenhower administration adopted in the 1950s in response to its perceived fiscal problems. There was no explicit discussion of resuming old nuclear missions,

for instance, a new generation of atomic demolition munitions, ship-to-ship systems, air defense weapons, or Davy Crocketts. Nor, with the exception of the possible role of nuclear weapons in a future SDI system, did anyone raise the prospect of new nuclear missions. Several participants implied a possible exception to this trend: if hostile regional states acquire nuclear and/or chemical-biological weapons, the United States may need to revise its nuclear doctrine and forces specifically to deal with the issues that such proliferation would raise.

As a final observation, it is important to note that any or all of the currently-apparent long-term political trends to deemphasize nuclear weapons could shift rapidly. As one participant noted, many of these same sentiments about fundamental strategic changes were also widely expressed at the beginning of the Carter administration, only to be altered dramatically by events at the end of the 1970s. Nevertheless, the views reported here do represent the combined perspective of some of the most knowledgeable people in the country about the future of nuclear weapons over the next three decades.

THE FUTURE OF NUCLEAR WEAPONS STUDY

The Future of Nuclear Weapons conference represents one of the principal products of a three-year CNSS study on the long-term future of nuclear weapons. We would like to acknowledge the strong support and encouragement for this study by John Hopkins, Los Alamos. The Future of Nuclear Weapons study will formally conclude with the publication of an edited volume drawn from the study and the conference proceedings. This work, to be published by Plenum Press, will be the first publication in the CNSS book series, *Issues in National Security*.

THE FUTURE OF NUCLEAR WEAPONS:
THE NEXT THREE DECADES

Center for National Security Studies
Los Alamos National Laboratory
June 6-8, 1988

Conference Agenda

Monday, June 6

9:00	Welcome	Siegfried S. Hecker Director, Los Alamos National Laboratory
9:05	Introduction	Robert Selden Director, Center for National Security Studies, Los Alamos
9:15	*Policy Perspectives*	Joseph Nye, Harvard University Session Chairman
9:25	The Evolving Soviet Regime	The Future of Soviet Politics and Society Thomas Sherlock for Seweryn Bialer, Columbia University The Evolution of Soviet Military Doctrine Daniel Goure, SRS Technologies
10:50	Break	
11:00	Regional Issues and Interests	European Political and Military Perspectives George Quester, University of Maryland The East Asian Security Environment Jonathan Pollack, RAND
12:30	Lunch	
1:45	U.S. Policy Choices and Constraints	Basic U.S. National Security Policy Stephen Cambone, SRS Technologies Nuclear Policy and Doctrine Leon Sloss, National Security Consultant

3:15	Break	
3:30	Public Opinion and Arms Control	
		Public Opinion and Political Culture David Yost, Naval Postgraduate School Arms Control: Beyond INF and START Steven Maaranen, ACDA
5:00	Reception	
6:30	Dinner	The Future of the Nuclear Weapons Laboratories Siegfried S. Hecker, Los Alamos

Tuesday, June 7

8:30	*Technology Perspectives*	John Foster, TRW Session Chairman
8:40	The Development of Nuclear Weapons Technology	
		Nuclear Weapons Technology: Past and Present John Hopkins, Los Alamos Nuclear Weapons Engineering Orval Jones, Sandia The Future of Nuclear Weapon Design Technology George Miller, Livermore
10:30	Break	
10:45	The Future of Nuclear-Related Technologies	
		Weapon System Technologies George Jeffs, Rockwell Command, Control, and Communication Technology Ashton Carter, Harvard University
12:15	Lunch	
1:15	The Future of Non-nuclear Technology	
		The Evolution of Nonnuclear Technology Richard Brody, Pan Heuristics Comments John Browne, Los Alamos

2:30	*Military Perspectives*	Brent Scowcroft, International Six Incorporated, Kissinger Associates Session Chairman
2:40	Future Service Requirements	The Air Force and the Future of Nuclear Weapons Joaquim E. Scholz, Orion Research The Navy and the Future of Nuclear Weapons William J. Holland, Armed Forces Communications and Electronics Association The Army and the Future of Nuclear Weapons Colonel Raoul Alcala, U.S. Army
4:45	Adjourn	

Wednesday, June 8

9:00	The Future of Deterrence	Richard Wagner, Kaman Sciences
10:00	Panel Discussion	Robert Selden, Los Alamos Panel Chairman John Foster, Joseph Nye, Brent Scowcroft, Richard Wagner Panel Members
11:30	Adjourn	

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