Future Roles for Nuclear Weapons

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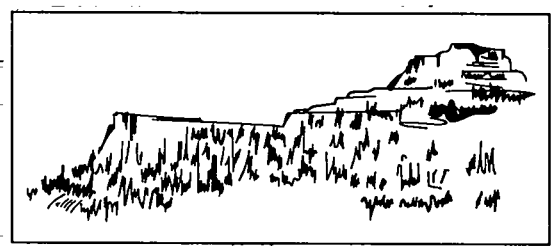

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PREFACE

The work presented here began in early 1985, and this report was completed in the fall of 1986. It is a contribution to the Center for National Security Studies (CNSS) study of the long-term future of nuclear weapons. The study has examined broad factors such as the international environment, the political evolution, the military requirements, and the technological developments that will shape nuclear weapons policy, strategy, and forces over the next three decades. The results of the study's first phase, described in this report, predate the major conference held at Los Alamos in June 1988 that brought together persons from throughout the nation to discuss the future of nuclear weapons. The views expressed at the conference should be considered, therefore, independent of the conclusions presented in this report, although the reader will find points of agreement between them (a conference summary has been issued as CNSS Paper No. 16). The Center's study on the long-term future of nuclear weapons will also include the publication of an edited volume drawn from the study and the conference proceedings. This work, to be published by Plenum Publishing Corporation, will be the first publication in the CNSS book series, "Issues in International Security."

Well in advance of the June 1988 conference, work had begun on the first phase of the study with the intent to provide insight into future nuclear weapon requirements to senior managers at Los Alamos, the other weapons laboratories, and their sponsoring agencies, who bear the responsibility to plan the nation's nuclear weapons program within a national policy framework and to develop the science and technology base that will be used to develop future weapons. While this first phase was designed to assist managers, the views expressed here are those of the study participants, and particularly the authors of this report, and are not necessarily those of Los Alamos management.

Any planning task implies thinking about the future, and this is particularly true for planners of the US nuclear weapons program because the weapons they develop today will stay in the stockpile for as long as thirty years. The science and technology base they are developing now will be the basis for designing and building weapons well into the twenty-first century.

But assessments of the future are debatable at best, and the future relating to roles and requirements for nuclear weapons is especially uncertain. Although a good deal of guidance for the nuclear weapons program is developed and promulgated through official government channels, it tends to focus most sharply on the next few years. Because of the pressures of time and events, this guidance does not always follow from an orderly and systematic attempt to analyze future trends and factors that will shape the nuclear weapons program.

In the first section of this report, the authors present key factors, or "drivers," that will influence the nuclear weapons program over the next thirty years and how these factors might evolve over time. Then, a plausible range of future international environments and US security policies are presented, thereby identifying at least the general shape and character of future nuclear weapons roles and requirements. The analysis of these potential roles and requirements is presented in a format designed to assist weapons program managers and planners in considering how various nuclear and non-nuclear weapons systems and technologies might meet future national needs.

Three caveats should be kept in mind. (1) This first phase of the study is based on the work of a well-qualified but small working group. Although efforts were made to minimize "scenario dependence,"

the report cannot be entirely free of the views, opinions, and even biases of the working group and the authors. (2) To allow for orderly analysis, this work followed a systematic, hierarchical format leading from international and domestic conditions to illustrative "futures" to US policies and finally to resulting nuclear weapons missions and tasks. This approach has the advantage of detailing the logic by which potential future requirements are derived. It has, however, the disadvantage of bearing little relationship to the very complex and not always very consistent way in which requirements usually are developed. Moreover, following this approach means that the findings of the study are likely to reflect the structure and assumptions it incorporates. (3) There are a multitude of factors and unpredictable events that will, in fact, combine to create the future. In this first phase of the study, we have tried to identify the key influences, to trace some possible courses those influences may follow, and then to assess the roles that nuclear weapons may be required to fulfill in support of future national security objectives; we caution the reader to evaluate important events and developments as they occur and integrate them into his estimate of how the future will be shaped.

This report is based on extensive work carried out primarily by a working group assembled and directed by Frederic M. Leykam, President of the Washington Defense Research Group. Mr. Leykam assisted in formulating the study plan and directed the work of the core group throughout the study. The members of the working group were Craig W. Hartsell, Frederic M. Leykam, Joachim E. Scholz, Leon Sloss, and Peter A. Wilson. Their views and analyses are reflected throughout this report, including the discussion of future developments, the definition of the "futures" used for analysis, and the derivation of potential nuclear weapons missions and tasks. The working group was assisted by comments and suggestions from Raymond Pollock, Ronald H. Stivers, Col. Robert Linhard, Gerold Yonas, Marc D. Millot, Chris Lay, Paul Kozemchak, Walter B. Slocombe, and David G. Wiencek. The discussion of operations concepts is drawn directly from work by Joachim E. Scholz, William Hulvershorn, and Gordon Kearl, under the direction of Joachim E. Scholz.

Another group consisting of Davis B. Bobrow, William E. Kriegsman, and Stephen R. Hill of the Mesa Consulting Group, Inc., examined historical influences on the Los Alamos National Laboratory's nuclear weapons program. Their findings helped shape the analysis and conclusions of this report.

Several people at Los Alamos have been instrumental in this first-phase study. John C. Hopkins initially sponsored this work and has continued to suppport it. In addition, Lawrence Germain, Donald Wolkerstorfer, John Weltman, and Stephen Cambone provided valuable review and comments throughout on both the approach and the findings of the study. Michael Henderson, John Taylor, Donald Wolkerstorfer, and Lawrence Germain provided insights into potential weapons technologies. Denis Fakley commented extensively on the study as it progressed. He provided a useful questioning of some of our assumptions from the point of view of a British reader.

This report, written by Steven Maaranen and William Davey, attempts to reflect faithfully the findings and the spirit of the study activities. Inevitably they bear final responsibility for the report, and for their own views which may have found their way into the study and report.

GLOSSARY

ABM	Anti-ballistic missile
ASAT	Anti-satellite
ASW	Anti-submarine warfare
ATBM	Anti-tactical ballistic missile
AWACS	Airborne warning and control system
BMD	Ballistic missile defense
CBW	Chemical and biological warfare
CNSS	Center for National Security Studies
COMECON	Soviet economic community
CONUS	Continental United States
C^3	Command, control, and communications
C^3I	Command, control, communications, and intelligence
DEW	Directed energy weapon
ECM	Electronic countermeasure
EMP	Electromagnetic pulse
GNP	Gross national product
GPF	General purpose forces
ICBM	Intercontinental ballistic missile
INF	Intermediate-range nuclear forces
NATO	North Atlantic Treaty Organization
NCA	National command authority
NIC	Newly industrializing countries
PBV	Post-boost vehicle
PRC	People's Republic of China
R&D	Research and development
RDT&E	Research, development, testing, and evaluation
SAM	Surface-to-air missile
SDI	Strategic Defense Initiative
SLBM	Submarine-launched ballistic missile
SLOC	Sea lines of communication
SOF	Strategic offensive forces
SSBN	Nuclear-powered ballistic-missile submarine
SSGN	Nuclear-powered cruise-missile submarine
SSN	Nuclear-powered attack submarine
TNF	Theater nuclear forces
TVD	Theater of military operations (Soviet acronym)
WTO	Warsaw Treaty Organization

CONTENTS

FUTURE ROLES FOR NUCLEAR WEAPONS

by

Steven A. Maaranen and William G. Davey

EXECUTIVE SUMMARY

This report describes the first phase of a study being conducted by the Center for National Security Studies to examine the broad factors such as international affairs, political evolution, military requirements, and technological developments that will shape nuclear weapons policy, strategy, and forces over the next three decades. This first phase seeks to identify the key influences, trace some possible courses those influences may follow, and then assesses the roles that nuclear weapons may be required to fulfill in support of future US national security objectives. In the process, a consistent, hierarchical, and comprehensive format is followed so that the relationships between the successive stages in the argument are clear. This should allow the study to be updated or amended as users desire or as the evolution of events demands.

Study Approach and Organization

This first phase began with a general survey of recent trends and possible future developments in the general areas of international affairs, US foreign and defense policies, and science and technology related to weapons. This survey was then analyzed, and nine factors, or "drivers," were identified that are likely to have a major influence on future requirements for nuclear weapons.

To use this broad analysis as a basis for identifying potential future nuclear weapons requirements, four "futures" were generated, based on varying developments of the drivers. Each future represents an alternative environment to which the United States may have to respond. One future, the Baseline, is an extrapolation from current trends and thus is more plausible in the shorter term. However, none is a specific projection or prediction of events, and each is intended to be equally plausible in the long term. However, the four futures were chosen to bound the spectrum of plausible future environments. Next, potential nuclear weapons missions and tasks were identified which would be necessary to underwrite US defense strategy for each of these futures. The missions and tasks were examined, and compared across the futures, to understand how much difference it would make for potential nuclear weapons requirements if one or another of these futures were to emerge.

Drivers Of Future Security Requirements

Nine important drivers of the future environment surrounding nuclear weapons roles and requirements were identified.

- The performance of the economies of the United States and the other Western industrialized states, and US budgetary allocations to defense.
- The choice by the United States of an internationalist or an isolationist foreign policy, the status of US alliance relationships, and the policies of US allies.
- The performance of the Soviet economy, and the response of the Soviet regime to that performance.
- The Soviet decision on whether or not to reduce its foreign policy commitments, in some way restrain its defense policy, and reduce its allocations to military forces.
- Alterations in US defense strategy, in particular domestically driven reductions in the role of nuclear weapons, or the deployment of strategic defenses.
- The role of arms control in US policy, and the limitations imposed by specific agreements.
- The emergence of powerful new states or regional groups, and the distribution of advanced weapons and weapons technology.
- The competitiveness (including cost competitiveness) and preference for non-nuclear weapons to fill potential nuclear weapon missions.
- The comparative development and utilization in the US and the USSR of nuclear and non-nuclear weapons supporting technologies, and the appearance of weapons-related technical breakthroughs.

Four Illustrative Futures

The four futures that were developed on the basis of the general trend analysis and evaluation of drivers are titled Baseline, Increased Competition, Fortress America, and Less Hostile USSR.

The Baseline Future. This is an extrapolation from current trends and thus is more plausible in the shorter term although no more plausible in the long term. It represents a moderate threat case. In this future, the global economy is growing and protectionism has not grown to a troublesome level in the West. But the Soviet Economic Community (COMECON) has become further isolated from the global economy and its growth. The economic power of the US and the USSR has decreased relative to the rest of the world, but severe internal problems have reduced the economic power of the USSR much more than that of the US.

These economic circumstances have translated, albeit imperfectly, into global geostrategic changes. For while their military superiority relative to the rest of the world has diminished, the US and USSR remain the only superpowers. Moreover, they remain essentially comparable to each other in strategic military power. In defense and foreign policy, the USSR is cautiously expansionist, but its global position has weakened and its global commitments have been reduced. The Warsaw Pact is intact but weakened and unreliable. The United States, on the other hand, retains an activist international policy, and the US continues to participate in a network of alliances to contain Soviet expansion. The NATO alliance survives and European NATO states have deployed theater ballistic missile defenses. There are strong public pressures in the US for negotiated arms reductions.

US strategy relies heavily on strategic offensive forces to deter and contain the USSR. This strategy is based on an ability to inflict unacceptable damage on the USSR after absorbing a major Soviet strike. Strategic offensive forces are called on to pose a range of threats to Soviet leadership, military forces, and industry. Limited arms control agreements, including the Anti-Ballistic Missile (ABM) Treaty and an anti-satellite (ASAT) weapon ban, are in force. The US does not emphasize military uses of space and has

not developed space weapons, but a Strategic Defense Initiative (SDI) research program is retained as a hedge. The US procures non-nuclear rather than nuclear weapons when possible.

The Increased Competition Future. This represents a magnified threat to the United States, composed of both a heightened military and political confrontation with the USSR and an additional threat to the US in the Americas. Here, protectionism and nationalism have slowed the growth of the non-Soviet-bloc economies, particularly those in the Third World, while successful economic reforms have led to a strong economic resurgence in the Soviet bloc.

In geostrategic terms, the US and the USSR remain the dominant world powers, and the only superpowers, but the military power of the USSR has grown relative to the US, the West, and the rest of the world. Outside the boundaries of the superpowers, widespread deployment of advanced non-nuclear, chemical, and biological weapons has occurred, together with limited nuclear weapons proliferation. The Soviets have increased their efforts to expand their influence and reduce the influence of the United States, especially in the Third World. That is where the risk of superpower confrontation is greatest. In particular, the Soviet Union has supplied a revolutionary, anti-US regime of a major country in the Americas with military equipment and infrastructure. In response to the increased threat, the US continues to rely on forward-based alliances to contain the Soviet Union, particularly in Europe, but has been forced to reposition some of its forces into the Western Hemisphere to meet the threat there.

The United States adds a large component of strategic and theater defenses to its offensive forces, in order to retain its ability to deter and contain the USSR. The US defense strategy is based on a combination of denial through the use of offensive and defensive forces, and retaliatory strikes against Soviet leadership, military forces, and industry. However, Soviet strategic defenses have restricted US strategic strike capability and missions. All arms control agreements have lapsed, and both powers build forces to satisfy their perceived requirements.

The Fortress America Future. This is a moderate threat case, whose key feature is a sharp US withdrawal from commitments outside the Western Hemisphere. This future postulates a severe depression in the non-Communist world, produced by cascading protectionist policies in the Western industrialized states. The economic isolation of the Soviet bloc partly insulates it from the global economic troubles, allowing the USSR to increase its relative economic strength.

The US and the USSR remain the only true superpowers, although the US world role has been importantly reduced and Japan as well as Western Europe have grown in prominence and military strength. The US-Soviet relationship is one of competitive coexistence. The US withdrawal from Eurasia has reduced the points of contact and friction between the two superpowers; the USSR, prudently expansionist, pursues superiority in Eurasia and the Third World, but shows little inclination to challenge the US in the Western Hemisphere.

The United States, perceiving Soviet strategic and projection forces as the main threat, has turned to a heavy reliance on strategic defenses and maritime forces. Strategic defenses are designed to protect the US from attack as far as possible, and to ensure adequate US retaliation to destroy the most important Soviet leadership and recovery assets, despite the effects of extensive Soviet defenses. The US-Soviet arms control regime limits strategic offenses and permits defenses, reflecting mutual concern for limiting the level of threat against superpower homelands. The US and the USSR freely use space, but refrain from activities which directly threaten each other's defensive systems.

The Less Hostile USSR Future. The final future is a low-threat case in which the USSR, because of a deteriorating internal situation, has arranged a strategic accommodation with the US in order to maintain

its threatened position in Eurasia. This future postulates a growing world economy, apart from the economic failure of the Soviet system. In military, economic, and political terms, the power of Japan, Western Europe, and several newly industrializing countries has increased, especially relative to the USSR, and the rising power of the People's Republic of China (PRC) poses a major new threat to the Soviet Union. The US and USSR remain the only full-fledged military superpowers, and, due to US restraint, their military power is essentially equal.

In response to this situation the Soviet Union avoids further efforts at expansion, seeks accommodation with the United States on strategic matters, and concentrates on domestic reforms and strengthening its position in Eurasia. The United States maintains an internationalist foreign policy, and continues to support forward-placed alliances to contain the USSR.

The US relies primarily on strategic defense to deny any possible nuclear attack on the US and its allies, but retains a minimal nuclear offensive retaliatory capability targeted on Soviet leadership and industry. Arms control agreements have cut offensive nuclear forces to a minimal level, and intermediate-range nuclear forces and conventional forces in Europe have been reduced. Reliance by the US on conventional forces has increased as nuclear forces have been reduced.

Potential Nuclear Weapons Missions And Tasks

Missions and Tasks in Each Future. Each future, composed of a unique set of global security circumstances, imposes differing requirements for US security policy.

In the Baseline future, where strategic defenses are precluded, a prominent aim of United States deterrent strategy is to reduce the Soviet's confidence that they can achieve their very ambitious offensive objectives. To achieve this, US forces are assigned missions of interrupting Soviet attack execution and frustrating follow-on attacks. However, due to the difficulty of achieving this denial objective, the Baseline strategy places heavy reliance on deterring the USSR by assuring that the assets prized by the Soviet regime—survival of leadership, war supporting industry, and post-war recovery capabilities—are effectively held at risk. This entails several potential nuclear weapons missions. In addition, since in the Baseline the US still aims to actively contain the USSR, a number of potential nuclear missions aim at defeating Soviet ground forces in Eurasia and naval forces at sea. Beyond the Soviet threat, only the PRC is a large enough strategic power to require explicit potential nuclear missions for US forces. The increased terrorist and clandestine threats to the US also result in the establishment of new missions to protect the US.

In the Increased Competition future, the United States strives to support essentially the same defense strategy as in the Baseline. However, strategic defenses are deployed by both sides. To assist in denying Soviet strategic offensive success, the US adds defensive missions to facilitate the survival of US national command authority, endurance of the command, control, and communications (C^3) of its forces, and survival of a significant number of its land-based forces. Accordingly, protecting US defenses themselves becomes a priority task. The objective of holding at risk the highest Soviet values remains constant, but the presence of Soviet strategic defenses complicates these US missions. The containment missions remain much the same as in the Baseline. In terms of the defense of the continental US (CONUS) and the Western Hemisphere, however, the US dedicates forces and assigns some new offensive and defensive missions to its forces.

In the Fortress America future, both offensive and defensive missions support the objective of denying the Soviets successful attack options. Since offenses are constrained, a larger part of this burden is borne by defenses. Conversely, US strategic offensive missions are reduced because of offensive force limitations and Soviet defenses. As in the Baseline, the most valuable Soviet assets are still held at risk, but in these missions, US offensive forces are focused on a restricted set of the most important targets. Due to the US

withdrawal from Eurasia, the only containment missions aim at keeping Soviet projection forces out of the vicinity of the Western Hemisphere. Missions for the actual defense of key US assets and population begin to appear, with the presence of more effective defenses and reduced offenses.

In the Less Hostile USSR future, defensive missions are relied on predominantly to deter and deny success to any Soviet strategic attack. Because of effective Soviet defenses, US missions to deter by means of holding at risk valuable Soviet assets focus on a few of the most vulnerable targets in this grouping. Containment missions retain a considerable importance in this future, although the presence of defenses complicates them considerably. Missions to actually defend the US from damage from all quarters assume considerable importance.

General Conclusions

In terms of the global environment:

- Foreseeable changes over thirty years are unlikely to bring a revolutionary change in the global environment. In each of the futures, powerful US armed forces are necessary, and many potential roles for nuclear weapons persist. The Soviet Union continues to be the most serious military threat to the United States although the degree of threat could vary considerably.
- No changes are foreseen in either nuclear or non-nuclear weapons technologies that, by themselves, fundamentally alter the art of war or the balance of military power.
- A limited number of factors will influence the future role of nuclear weapons most strongly. Watching their evolution over time should provide valuable insight into future nuclear weapons requirements.

In terms of alternative futures:

- The size, the strategic purpose, and the technical emphasis of potential nuclear weapons requirements differ significantly according to which future is postulated.
- In all, 54 potential nuclear weapon tasks were identified by the study. A modest subset (14 tasks), which could be viewed as the requirements for a minimum security policy, was common to all futures examined.
- A much larger set of tasks (36 in all) was common to three or four of the futures and is probably deserving of more serious attention by planners.
- All of the potential nuclear weapons missions and tasks identified in the study serve one of five strategic purposes: denying the USSR success in a strategic attack; destroying assets of value to the USSR; containing Soviet expansion; defending the continental US and the Western Hemisphere; and deterring other potential aggressor states.
- The appearance of active defense strongly affects potential nuclear weapons tasks. US defenses, especially in combination with arms control limits on Soviet offenses, allow the US to shift toward denial strategies. Conversely, Soviet defense deployments lead the US to accept less ambitious offensive targeting goals, or pose more formidable offensive weapons requirements.
- In most cases, tasks appear which are designed to facilitate the survival and operation of offensive and defensive forces, and to reconstitute them during a war.

- Arms control limitations are usually present in some form. The consequent restraints on offensive forces, especially where they are combined with the deployment of strategic defenses, have a major impact.

In terms of weapon characteristics:

- Several potential nuclear weapons tasks tend to become much more difficult. As a result, there is likely to be pressure for more effective, probably more sophisticated, weapons, and perhaps for new approaches to accomplishing some missions. New and innovative nuclear and non-nuclear weapons designs may be able to contribute to meeting these new challenges.
- Non-nuclear weapons appear to be competitive with nuclear weapons for some, but by no means all, tasks. Detailed comparison of nuclear and non-nuclear technologies which might accomplish each of the missions and tasks identified in the study is required to evaluate the future relationship of nuclear and non-nuclear weapons.

INTRODUCTION

This first phase of The Future of Nuclear Weapons study being conducted by the Center for National Security Studies seeks to identify the most important influences on the US nuclear weapons program, and attempts to evaluate their development over the next thirty years. It then derives and examines a spectrum of potential requirements for US nuclear weapons. In doing so, it endeavors to provide a comprehensive, consistent, and thus clearly identifiable relationship between alternative future international environments and US policies and national objectives appropriate to those environments.

Throughout, this first phase emphasizes those elements that relate to nuclear weapons applications in the broadest sense. Thus, there are areas which either are not examined or are treated in a limited way since they are unlikely to lead to nuclear weapons requirements. Several supporting documents are available, and should be consulted for more detailed analyses. A list of these documents appears in Appendix A.

The first section of this report discusses the elements of the international, national, and technological scenes that are believed to be important in influencing the US nuclear weapons program. This survey was then analyzed, and nine "drivers" were identified that are likely to have a major influence on future requirements for nuclear weapons. In the second section, four different "futures," based on differing evolutions of the drivers, are defined, representing a range of "probable" futures. The third section derives potential nuclear weapon missions and tasks associated with all four futures, and compares and analyzes them. The fourth section presents the overall conclusions of the study.

Key to the validity of this study is the representativeness of the futures that are projected, and the logical progression from these to national objectives and derivative nuclear weapons needs. Although the futures selected for study are intended to circumscribe the reasonable boundaries of the future thirty years hence, they have not been exaggerated to produce extreme and very stressing situations. Accordingly each of the futures is plausible in terms of a broad thrust, but the details of each future should be viewed as suggestive, not definitive. In particular, the chief merit of the Baseline future is that it projects present trends, and thus may be more readily assessed by the reader. It is not meant to be a more valid or accurate prediction than the other futures.

The study deliberately avoids any surprise events or technological breakthroughs which the study participants felt were genuinely unpredictable or improbable. Events such as a major nuclear war between the US and the USSR would definitively alter the world of the future; such events are outside the scope and intent of this study.

SECTION ONE: SURVEY OF POTENTIAL GLOBAL, DOMESTIC, AND TECHNOLOGICAL DEVELOPMENTS

The US nuclear weapons program of the year 2016 will be shaped by a combination of circumstances and influences. This section of the report identifies the factors which appear to exert the strongest influence on the nuclear weapons program, and traces the more likely ways in which they could progress over the next thirty years.

The International Environment

Some measure of the degree of change that may occur over the next thirty years can be obtained by looking back over the past three decades. The international environment has changed significantly over that time. Many of these changes were unforeseen by mid-fifties planners. Perhaps most importantly, communism, aggressively fostered by the Soviet and Chinese governments, failed to sweep across the remainder of Eurasia. Instead, the USSR and the People's Republic of China (PRC) split and the USSR has since been faced with potential enemies both to the East and the West. Moreover, the Soviet economy has failed to achieve the rapid growth expected in the mid-fifties, and has remained at about half the size of the United States' economy. Also surprising has been the rapid rise in economic power of Japan and the industrialized countries in Asia and elsewhere. Finally, the degree to which the world's states have been woven into a global economic, financial, and information system was largely unforeseen.

Additionally, many global developments expected by mid-fifties planners did not occur. Widespread famine has not accompanied exponential population growth in the Third World. Nuclear weapon states have not proliferated widely. Western Europe has not united to become a major world power. The great leap into space expected by some technology forecasters did not occur. The shift to the use of nuclear fission energy has been attenuated, and peaceful nuclear fusion energy remains in the research stage.

The long list of "misses" by mid-fifties planners counsels caution in looking ahead for another thirty years. Despite all of these changes in the past 30 years, the global environment of 1986 would still be recognizable to someone transported forward from the 1950s. Most importantly, the United States and the USSR still dominate the globe as nuclear-armed superpowers. They have not fought a major war against each other, and they have developed a competitive but seemingly well-regulated relationship. What pictures emerge from looking thirty years ahead on the basis of continued development of recent global trends?

Economic Developments. Global and national economic developments play an important role in any assessment of the future, since economic strength and progress are among the chief foundations of national power, and help shape international relationships. In this area, the study postulates that the most likely prospect for the next thirty years is for moderate economic growth by the industrialized countries, poor performance by the Soviet economic community (COMECON) states, and relatively rapid economic growth by many newly industrialized states. A large number of Third World states would remain very poor, however, and the gap between them and the rest of the world would continue to grow.

If recent trends are simply projected forward, the superpowers become less superior in economic terms relative to the rest of the world. At the end of World War II, the US gross national product (GNP) represented 50% of the gross world product. By the turn of the twenty-first century, the US share is expected to decline to 20%, and that of the USSR to less than 10%. The other industrialized states (Western Europe, Japan) and the newly industrialized states (particularly the PRC, India, Brazil, South Korea, Israel, and Taiwan, as well as Turkey, Singapore, and perhaps Thailand) should grow in importance economically. Japan attained the second largest GNP in the world in 1986. Further,

in the unlikely but not impossible event that the PRC's economic growth were maintained at 8% per year, it would have a larger GNP than the Soviet Union in the first decade of the twenty-first century.

Alternatives to this leveling out of global economic power are certainly possible. A lower rate of economic growth by the US and the Western industrialized states could result from, among other things, a serious bout of protectionism, which could be brought about by a variety of circumstances, economic and political. The resultant contraction of world trade would probably spill over into the newly industrialized states, but less so to the COMECON states because of their relative isolation from the global economy. This would lead to an overall reduction in the economic power of the West and the newly industrializing countries (NICs), and perhaps a relative increase in that of the East.

Another alternative is that the expected continuing decline in the relative position of the COMECON states could be reversed by major, successful economic reforms within the Soviet Union and the other COMECON states. This could proceed largely in isolation from the performance of the global economy, and could lead the USSR and its allies to maintain their current economic position vis-à-vis the rest of the world, or even to improve that position significantly if the West were to experience serious economic problems.

Superpowers. However, even in the face of a relative decline in the economic superiority of the superpowers, and growing economic stature of other states and regions, the US and the USSR will probably remain the world's only true superpowers (in military and political terms) thirty years from now. They are likely to retain superior strategic nuclear and non-nuclear offensive weapon capabilities, global C^3, power projection forces, and ability to use space for military and peaceful purposes. Should the superpowers develop and deploy advanced strategic defense systems, that would serve to distance them even further from other states in strategic capabilities–both by signifying their superior technological and military-industrial capabilities, and by devaluing any strategic nuclear or non-nuclear forces developed by the other powers.

Nevertheless, some major changes to the status of the two superpowers are possible in the next thirty years. For example, the United States could choose, in response to rising isolationist sentiment or because of severe economic reverses, to reduce its global role or allow its military capabilities to decline to the point where the US no longer sustained superpower status. Another possibility is that, if Soviet economic or nationalities' problems become even more severe than anticipated, the Soviets could turn inward to attempt to remedy them, even if at some cost—temporary or permanent—to their external ambitions.

Role of the Soviet Union. Under any circumstances, the external policy of the USSR will probably remain inimical to the US and its allies. While perhaps becoming more cynical about its ideological heritage and commitment, the Soviet Union is almost certain to retain its system of government and its rhetorical commitment to the eventual world-wide success of communism. The Soviet Union should be able to perpetuate subservient governments among its satellites, but those governments are likely to attempt to strengthen their ties with the West.

However, the Soviet government's ability to establish like-minded governments abroad appears to have declined greatly, and is unlikely to be restored unless or until the USSR can show that its political and economic model is worthy of emulation, and it is able and willing to support the costs of overseas ventures. The rapid accession to power of a large number of new Soviet-leaning governments, with or without overt Soviet intervention as experienced in the 1970s (in Angola, Ethiopia, Nicaragua, and Afghanistan), is unlikely to be repeated. It is possible, but less likely, that either through successful military intervention on the periphery of Eurasia or in the Third World or through improved economic performance the Soviet Union could restore the impression and reality of Soviet success, and thus solidify Soviet control over and

integration with its allies. Similarly, it is possible that the Soviet "empire" could erode or break up if the USSR were beset with serious enough domestic and external problems.

The Soviet Union will almost certainly continue its efforts to limit Western, and especially US, power, first and foremost by trying to divide the US from its allies in Western Europe. Further, the USSR is likely to persist in its efforts to win converts to its camp in the Third World, accepting modest risks of confrontations there with the US and its allies, either directly or through the use of surrogate forces. However, with diminishing economic power and a still unrealized and less persuasive ideology, significant progress toward these Soviet objectives should not be expected.

On the assumptions that the economic problems that face the West are ameliorated, those that face the Soviet Union become more acute, and that the Western states are reasonably successful in overcoming periodic domestic crises and intra-alliance differences, the overall non-military correlation of forces, in Soviet terms, should swing significantly toward the US.

Emerging Powers. The stature of other states and regions, and their significance to US policy, should grow. For example the emergence of a major, hostile state in the Americas (perhaps with the support of the USSR), could force the United States to reallocate its military resources, in some instances in a major way. A different kind of threat could be posed by a militant, unified pan-Islamic state. Such a state would not be a threat like an ordinary superpower, or regional power. But it could pose real and novel risks for the West as well as the USSR through its power to influence the flow of oil, its sponsorship and manipulation of terrorism, and its potential for nuclear weapons proliferation and possible use. Although these are improbable developments, it is only the development of such military threats that would seriously rival, or even significantly add to, the defense burden on the United States which is likely to flow principally from competition with the Soviet Union.

As noted earlier, the other contenders for superpower status are unlikely to have achieved it in thirty years. Western Europe is likely to remain disunited, and at least the key states are likely to remain full-fledged members of the NATO alliance. Japan, because of its small geographic extent and political predilections, should remain a friendly economic power, but not a military power. The PRC, because of its lack of an economic and technological infrastructure, proximity to the Soviet Union, and political volatility is likely to remain an industrializing state and a modest military power. However, the emergence of Japan or the PRC to a position where either could rival the superpowers is by no means inconceivable. An alliance of the PRC and Japan, however improbable, could constitute a true superpower in Asia.

Similarly, several of the newly industrialized states contending for regional power status certainly could achieve it, and should acquire increased economic and military power as well as quite advanced weaponry. This would be chiefly non-nuclear weapons technology and weapons systems, although the technology and know-how for developing nuclear weapons may be readily available to them. The acquisition of advanced weapons should assist regional powers to gain stature, assert their independence within their own regions, and make the projection of military power into those regions by the superpowers much more hazardous than today.

Global Relationships. This course of global political-military development, advancing in an orderly way from present trends, could be altered in two major ways: US-Soviet political and military relationships could evolve differently; or new centers of power threatening to the US or the USSR could emerge. In terms of the US-Soviet power relationship, the Soviet Union could achieve a stronger position abroad based on greater than expected economic success at home, allowing it to alter and to exploit the correlation of forces in its favor. This could lead to significant Soviet gains around Eurasia and in the Third World. Likewise, a turning inward by the United States and reduction of US global security commitments could

lead to greater Soviet military and political success abroad. Less likely, but nevertheless conceivable, is a broad US-Soviet political and military detente, based perhaps on an agreement for a transition to a Strategic Defense Initiative (SDI) environment.

Another alternative is that a new center or centers of power could arise, creating a more multi-polar world power structure. As noted, few states appear to have the potential to approach true superpower status over this period. However, the alliance of a modernizing PRC with Japan, the creation of an effectively united Western (and conceivably Eastern) Europe, or the more rapid development of several regional powers is possible, and would create a more multi-polar world than has been known in the 1980s.

The United States and its Policies

Whatever the objective development of the international environment during the next thirty years, it is the US perception of that environment, along with domestic conditions in the United States, which will condition America's actual response.

The US Economy. The state of the US economy and the allocation of resources to defense are factors which strongly affect the US response to external developments. Since 1950, the US has spent an average of 8-9% of its GNP on defense, and no more than 15% of recent defense budgets on strategic forces. The record indicates that, in normal times, this is a useful guide to expected allocations. In response to a major crisis this allocation could change rapidly (e.g. the doubling of real growth in defense outlays after the outbreak of the Korean war). Other crises, such as a breakdown of arms control negotiations, a federal deficit crisis, or a global economic crash could also cause temporary shifts from this pattern. But the record suggests there is a tendency over the long term to return to this level of allocations.

Arms Control Policy. Public and congressional opinion on a number of issues also strongly influence actual US policies. Prominent among these is the question of what role arms control and nuclear weapons should play in US security. Arms control, despite its limited success in placing meaningful limits on armaments, is still popularly perceived as a principal method of reducing superpower tensions. In this sense, arms control has become a political imperative for the United States. Its pursuit is likely to endure, within a narrow range bounded by the need to explore every opportunity to reduce tensions and the competitive nature of US-Soviet relations. Arms control negotiations along the lines of INF and START are likely to continue, perhaps being supplemented by further agreements leading to reduced levels of nuclear forces. Given public attitudes, the effort to achieve agreement is likely to continue even if progress is limited.

However, alternative arms control futures are still possible. One would be the conclusion of arms control agreements which sharply reduce strategic offensive nuclear forces (at levels far below START). This could result from severe constraints on offensive forces combined with a prohibition on strategic defenses (instituting something approaching a minimum assured destruction regime), or from an agreement reducing offensive forces, but phasing in strategic defenses (approaching "mutual assured survival").

Alternatively, it is possible, though not probable, that the US could abandon efforts to achieve negotiated arms control due to disenchantment with the results of arms control agreements, or following on the development and deployment of military forces that defy effective limitation and verification. In those circumstances, negotiated arms limits could be replaced by unconstrained competition, or unilateral constraint.

Irrespective of other arms control agreements, it is possible that a significantly lower nuclear testing threshold, or even a comprehensive prohibition on nuclear weapons testing, could be agreed to. However, this would severely constrain the ability of the US to develop new nuclear weapon systems with improved

safety and military effectiveness, and it would lead to a gradual erosion of confidence in US nuclear weapons in stockpile.

Public Attitudes Toward Nuclear Weapons. Related to, but somewhat separate from, international arms control efforts, are US public and congressional concerns with defense strategy and in particular the role of nuclear weapons. Over the years there has been a cycle of concern followed by relative quiescence on these issues. The heightened concern with these matters noted in recent years, while abating temporarily, is likely to return. Moreover, questioning of strategy and nuclear weapons has expanded to include the morality as well as the efficacy of deterrence, and the nuclear weapon requirements associated with deterrence. While this debate has not yet had a major impact on US strategy or forces, it points to continuing, and perhaps increasing, unease with reliance on nuclear weapons. These issues lead to a major unresolved dilemma that is likely to persist over the indefinite future: public fear of nuclear war creates pressure to reduce reliance on nuclear weapons, but the desire to minimize defense burdens calls for greater reliance on nuclear weapons–they are cheap, if dangerous.

Choice of a Different Strategy. If public concerns about the proper role for nuclear weapons become more powerful, they could lead the US to adopt a significantly different strategy, perhaps reducing that role. Such a change did in fact occur during the past thirty years—in the late 1950s when the US began a shift from a defense strategy based predominantly on a full spectrum of nuclear weapons to the strategy of flexible response. This led to the resurgence of non-nuclear forces and weapons, plus a long-term emphasis on offensive strategic nuclear forces combined with a prohibition on strategic defenses. Another major change in direction is certainly possible in the next thirty years.

One approach which has had many proponents over the years is to abandon stressing flexible response strategy, which requires credible nuclear first-use options, options for prompt, controlled retaliation, and the destruction of a wide range of targets, perhaps including very hard targets like missile silos. If the United States abandoned flexible response, it could adopt a strategy of bare assured destruction (based on the assured ability, in retaliation, to destroy a small number of relatively soft, fixed targets). Alternatively, the US could move toward SDI-type defenses, and reduce its offensive nuclear forces apace. Finally, the US could retain the structure of flexible response, but make a dedicated effort to replace nuclear with non-nuclear weapons wherever they appear to be competitive. Any of these alterations to current strategy would lead to reduced reliance on nuclear forces, and significant reductions in US offensive nuclear weapons.

Military Forces and Technologies. US policy thirty years hence will also be affected by the military forces the US maintains, and the weapons it procures for those forces. In general, current definitions of roles and missions between the services are likely to persist, while budgetary decisions will result in a force not sized, structured, or equipped to fully satisfy the demands of strategy. Pressure to procure small numbers of very advanced weapons, to develop and procure multi-mission weapons, and to eschew weapons that challenge prevailing arms control desiderata are all factors that are likely to persist. A force/policy mismatch and a force/commitments mismatch are both likely to hamper US strategy.

The capabilities of US military forces could, however, be affected strongly by the development and procurement of new weapons technologies. In deference to public opinion, and in response to the desire to raise the threshold for nuclear weapon use, the stated US preference for non-nuclear over nuclear weapons is likely to persist, especially in the non-strategic arena. However, countervailing pressures in favor of nuclear weapons will be exerted by the potent, perhaps irreplaceable deterrent value of nuclear weapons (as seen by elements of both US and allied opinion). Nuclear weapons will also tend to remain attractive because they are likely still to be cheaper than alternative non-nuclear weapons for many tasks, and because

many targets which the US hopes to hold at risk will probably continue to be invulnerable to non-nuclear weapons.

US International Role. These factors play an important part in conditioning the United States' foreign policy response to the international environment. Fundamentally, that response can take one of two forms. The United States can continue its leading role in international affairs, or it can assume a more isolationist policy. From the late eighteenth century to the early twentieth century, the US chose to remain detached and to a large degree isolated from world politics. Since 1945, the US has maintained an unprecedented peacetime defense establishment, especially compared with the inter-war period, and has deployed its forces globally. At the same time, the concerns of America's foreign policy have become truly global.

Given the world-wide interdependence in economics, transportation, and communications, and the prominent position that the US will continue to play in these arenas over the next thirty years, it would be difficult (and very surprising) for the US to withdraw completely from an active diplomatic and military role on the world scene. The United States will probably still perceive the Soviet Union and its allies to be a major and vital threat, and it is unlikely that other superpowers or combinations of powers will have arisen to substitute for the US as the chief guarantor of the security of the West.

However, while US and Soviet military power are likely to remain roughly similar, the non-military aspects of the correlation of forces may shift considerably toward the US and away from the USSR in this period. As a consequence, the US may perceive a somewhat reduced threat to itself and its allies. And with a probable increase in the overall power of US allies and other non-Soviet states, the US may believe the demands on its defense strategy to have diminished. While this could lead to a modest standing-down of the US from its global commitments, it is unlikely that the United States would seriously abandon its overall internationalist orientation. The US, then, will probably still accept the role of leader of the West, and seek to retain its system of alliances in Europe and the Pacific. However, the US will probably continue to seek to shift a larger portion of the local defense burden in Europe and Asia to its allies.

A major reduction in the US global role cannot be completely excluded, however. Domestic political support in the United States for defense and alliance commitments at post-World War II levels has varied in recent years, responding to specific events, such as the Vietnam War, the Iranian hostage crisis, and intermediate-range nuclear force (INF) deployment. In part, it reflects an abiding isolationist undercurrent in American politics. A significant US turn toward isolationism could result from several factors, such as a major change in US domestic opinion, or estrangement from US allies over political, economic, trade, or military issues.

Technological Change

Over the next thirty years, science and technology will tend to develop according to a different set of factors than those which influence politics and world opinion. The course of development of science will be shaped by both technical and non-technical influences.

Constraints on Technology. Turning first to non-technical influences, some of those which have operated in recent years are likely to persist. Notable among these are funding limitations and a disinclination to proceed with development of certain technologies for policy reasons. For example, some weapon systems such as dual-capable missiles may complicate arms control, while some weapon technologies such as chemical and biological weapons or enhanced radiation warheads may be unacceptable to democracies.

Mission Requirements "Pull." The most important external "pull" on weapons science and technology derives from mission requirements, which themselves are contingent on the needs of US strategy. Current strategy and associated policy requirements place strong demands on the nuclear weapons program. At present, these programs must meet stringent demands for safety, security and survivability, and restrictive delivery system configurations. Major mission pull is exercised by the desire to hold at risk assets of great value to the Soviet leadership. Since those assets are increasingly protected with active and passive defenses, it is a continuing challenge to develop US weapons able to destroy them. For example, ways must be found to threaten "hardened" targets such as missile silos and leadership facilities and moveable or mobile targets such as mobile ballistic missiles or moveable command posts.

Defense strategy can, however, change swiftly, altering demands for US weapons dramatically, and affecting the pace and priority of weapons science and technology programs. For example, the US could alter or discard the requirement to hold at risk hardened silos. If Soviet hard targets prove to be genuinely invulnerable, if Soviet mobile missiles assume the reserve force role (meaning most Soviet silos would be empty by the time a US retaliatory strike arrived), or if the US deployed strategic defenses able to intercept nuclear ballistic missiles, the US could reevaluate its strategy and perhaps find a rationale for abandoning the counter-silo mission sometime in the future.

On the other hand, future strategy-driven requirements may place even greater demands on US weapons technology. For example, a decision to attempt to defend the US and its allies from ballistic missiles would require the deployment of defensive weapons able to intercept and destroy Soviet offensive nuclear forces. This would result in a large new set of mission requirements.

Evolutionary Changes in Weapons Science and Technology. Turning to the technical aspects of the science and technology relevant to the US nuclear weapon program, important, though evolutionary, progress is likely to occur over the next thirty years. On the other hand, a political decision to proceed with SDI, along with a sufficiently promising SDI development program, could have very large consequences for both offensive and defensive nuclear weapons. It is also possible that genuine breakthroughs could occur in areas of science and technology relevant to current weapons or in other areas that could have dramatic weapon consequences (e.g. genetic engineering). Such a breakthrough, occurring in the US or the USSR, could fundamentally alter the art of war or the strategic balance. No breakthroughs of this kind are foreseen, but it is impossible to say that they will not occur.

Delivery Vehicle Technologies. Improvements in delivery vehicle technologies will affect how well they can achieve their missions in an increasingly challenging environment. Most developments in delivery vehicles would probably have modest and gradual consequences for US nuclear weapons. In general, delivery vehicle and chemical propulsion technologies are quite mature, although there is considerable room for growth in terms of their application to specific missions. In the area of ballistic missile technology, significant developments may include missiles with flight trajectories that stay within the atmosphere, fast burn boosters, and fast operating post-boost vehicles (PBVs) or other unconventional approaches to PBV design. Such changes would assist with the problems of defense penetration, and attacking mobile and relocatable targets.

Evolutionary advances in aerodynamic delivery vehicles will also occur. Cruise missiles should benefit from incremental advances in engine design (giving greater range for a given size, increased payload, or a reduction in overall dimensions). The use of low-observable (stealth) technology should assist future cruise missiles to penetrate improving Soviet defenses. The application of advanced guidance technology such as satellite navigation updating and direct target sensing may allow weapons that can hit their targets independently of range.

Improvements in sensor technology have made high-altitude penetration by manned bombers very difficult, so efforts will probably be concentrated on technologies to assist low-altitude penetration. This should result in continued application of low-observable technology to manned bombers. However, the use of stealth technology will probably continue to force design trade-offs that reduce their efficiency. That, along with the desire to reduce overall aircraft size to reduce observables, could lead to a desire for smaller air-delivered weapons.

Defensive Weapons. Rapid development of defensive weapon technologies will probably continue, irrespective of the success of the Strategic Defense Initiative. This could lead to US deployment of moderately effective ballistic missile defenses as well as improved air defenses. Both nuclear and non-nuclear defense technologies should be available for employment in either ground-based or space-based modes within thirty years. These should include a number of relatively exotic technologies (directed energy weapons, active discrimination, etc.). Technologies which allow for space-basing of weapons for ballistic missile and perhaps aerodynamic intercepts, as well as sensing, discrimination, and battle management, could be developed. Parallel development of technologies for defending against theater ballistic missile and aerodynamic threats could occur. Theater defenses could rely on some common elements with the US defenses, but would probably include specially designed defenses to meet the unique theater missile and aerodynamic threats.

Space Technologies. Technologies to utilize space for military purposes should continue to advance. The key issue is whether or not survivable or effectively reconstitutable space assets, or system configurations, can be developed in the face of improving anti-satellite technology. There is a potential for greatly improved efficiency in delivering payload into space, and this could increase the potential for reconstituting space assets.

Nuclear Weapons Technologies. Nuclear weapons have been in existence for a long time, and in many respects the technology is quite mature. Still, there is an impressively large number of potential improvements which may have valuable mission applications. These include improvements in "conventional" nuclear weapons, and in more advanced nuclear weapons designs (e.g. "tailored" outputs and conversion of nuclear explosive energy into various forms of directed energy). Nuclear weapon development cannot be considered to have reached a technological plateau. However, public and political pressures, such as concern over "nuclear winter," may slow or halt some technological developments.

The status of Soviet nuclear weapons technology is jealously guarded by the Soviets. What is plain is that they pursue an impressively broad and diverse nuclear weapon program. They will probably continue to deploy weapons matched to new generations of delivery vehicles. As these vehicles become smaller and gain greater accuracy, Soviet nuclear weapons will probably continue to become smaller and optimized to their carriers. The Soviets certainly possess a versatile and sophisticated design capacity, which they almost certainly will continue to exploit in order to develop nuclear warheads for a wide variety of weapon systems. In general, the Soviets are likely to be as competent as the US in nuclear weapons technology and design capabilities, although their apparent and probably continuing lag in computer capacity may handicap some elements of design work. They probably are as well placed as the US for evolutionary development of their program, and for potential breakthroughs in nuclear weapons technology. Further, because of their ability to keep scientists working at their weapons facilities, the large throw-weight capability of their missiles, and their potential for clandestine nuclear testing, the USSR would probably be better placed than the US to maintain their nuclear weapons program during a comprehensive nuclear test ban.

Conventional Weapons Technology. Non-nuclear weapons should increasingly compete with nuclear weapons for deployment on new US weapon systems, despite the fundamental limitation, vis-à-vis nuclear weapons, that any damage is more easily repairable. Thus, wholesale replacement of nuclear with non-nuclear weapons is not foreseen. Advances in guidance, sensors, on-board processing, and munitions effectiveness will make non-nuclear weapons ever more capable. Further, the desire to use non-nuclear weapons where possible will probably persist. The effectiveness and actual applicability of non-nuclear weapons technologies for potential nuclear weapon missions must be evaluated on a case-by-case basis.

An initial survey of the mission applicability of nuclear and non-nuclear weapons indicates that for some missions, non-nuclear weapons, if perfected with the appropriate attributes, could effectively substitute for nuclear weapons. In general, non-nuclear weapons are effective substitutes for soft or moderately hardened point targets if they are given near-perfect accuracy. Non-nuclear weapons also have an advantage if minimal collateral damage is desired, or if there are concerns about timely release or political-military consequences of nuclear weapons. They may be especially useful against military equipment such as tanks, aircraft, radars, and the like, which they should be able to destroy or damage beyond repair. Against many other targets, especially area targets such as airfields, most non-nuclear weapons envisioned do not have the nuclear weapon's ability to destroy the target beyond repair, and indeed impede subsequent repair efforts. It is anticipated that public and political pressures will continue to impede the development of chemical and biological warfare weapons. Overall, evolutionary development of other non-nuclear technologies with a continuing political and strategic bias in favor of non-nuclear weapons could lead to a reduction in the demand for nuclear weapons.

Weapons-Supporting Technologies. There will also be important advances in the technology base that supports nuclear and non-nuclear weapons. Of first importance are major advances in data acquisition, data analysis, and guidance technologies which will allow for the location and attack of remote, concealed, and evasive targets. Compact but highly sophisticated sensors may be carried on delivery vehicles or linked to them by (perhaps vulnerable) space platforms or remotely piloted vehicles. Future systems may be able not only to acquire multi-sensor information, but also analyze it to provide search and location data without external intervention. Multi-processor computers and artificial intelligence may contribute importantly to these systems.

Drivers of Future Security Requirements

In summary, the world that we would see thirty years from now, based on an extrapolation of past trends and a conservative estimate of possible developments, is still likely to be recognizable to an individual from 1986, just as 1986 would be to one from 1956. The world of 2016 would contain many of the key features we now know. The Soviet Union and the United States almost certainly will continue their rivalry, although its intensity and scope could vary considerably. They will probably remain the only two superpowers, exerting a potent influence on international affairs despite the rise in economic power of much of the rest of the world and even continuing weakness of the Soviet economy. Even the possible decline of the USSR, emergence of the PRC and Japan as near-superpowers, and growth of regional powers would not lead to a truly multi-polar world.

On the basis of this estimate, public opinion concerns and government policy options in the United States toward the considerable threat posed by the Soviet Union may very well remain roughly similar to those of today. That is, there will be varying degrees of determination to deal with the threat, and the US will have the choice of an internationalist or an isolationist foreign policy.

Finally, on the basis of a conservative estimate, the world would see moderately paced evolutionary advances in defense-related science and technology, although revolutionary developments could conceivably occur, drastically altering the military balance or even the art of war. Further, public pressures and political factors are likely to restrict weapons technology advances in the US to recognizable and relatively modest gains rather than foster unbridled development.

As this summary indicates, the continuation of existing trends in world affairs would lead to notable evolutionary changes over thirty years. In addition, significant alterations of any of those trends and influences identified as important drivers of the future could lead to a very different world by the year 2019. Those interdependent drivers are listed below.

- The performance of the economies of the United States and the other Western industrialized states, and US budgetary allocations to defense.
- The choice by the United States of an internationalist or isolationist foreign policy, the status of US alliance relationships, and the policies of US allies.
- The performance of the Soviet economy, and the response of the Soviet regime to that performance.
- The Soviet decision on whether or not to reduce its foreign policy commitments, and in some way restrain its defense policy and reduce its allocations to military forces.
- Alterations in US defense strategy, in particular domestically driven reductions in the role of nuclear weapons, or the deployment of strategic defenses.
- The role of arms control in US policy, and the limitations imposed by specific agreements.
- The emergence of powerful new states or regional groups, and the distribution of advanced weapons and weapons technology.
- The competitiveness, cost-effectiveness, and preference for non-nuclear weapons to fill potential nuclear weapon missions.
- The comparative development and utilization in the US and the USSR of nuclear and non-nuclear weapons supporting technologies, and the appearance of weapons-related technical breakthroughs.

SECTION TWO: FOUR GLOBAL FUTURES AND THEIR REQUIREMENTS FOR US NATIONAL SECURITY

The global environment, United States policy, and technological capabilities can develop in numerous ways over thirty years. Each variation might exercise quite distinct influences on the potential roles for nuclear weapons, and the types of weapons required. Each of these different developments could be compounded by changes in other factors. To accommodate these alternative evolutions in a format that allows for detailed analysis, four futures were chosen where drivers vary in different ways, to illustrate alternative paths of evolution. In this section of the paper, these four futures are described and examined in detail to determine their implications for nuclear weapon requirements.

The Baseline future is a moderate-threat case which results from extrapolating current trends and conservatively estimating future developments. Each of the remaining futures assumes that one or more of the drivers identified in the previous chapter changes in important ways, creating a characteristically different global security situation, and US response. The Increased Competition future is a high threat case which postulates heightened tensions, an open military competition, but not war, between the US and the USSR, and poses a new threat to the US in the Western Hemisphere. Fortress America assumes a major withdrawal of the United States from its current Eurasian security commitments, and retrenchment on a less

ambitious defense strategy. Finally, the Less Hostile USSR future is a low-threat situation where the Soviets, under pressure from internal and external events, have chosen to seek a strategic accommodation with the US to protect their most vital interests and, in general, have agreed to lessen the US-USSR confrontation.

The Baseline Future

The Baseline is an extrapolation from current trends and thus is more plausible than the other futures in the shorter term although not in the longer term. It represents a moderate-threat case. In this future, the global economy is growing robustly with low inflation rates and continues to integrate, the world debt problem has been overcome, and protectionism has not grown to a troublesome level. However, COMECON has become further isolated from global trade and growth. The economic power of the US and the USSR has decreased relative to most of the rest of the world, but severe internal problems have reduced the economic power of the USSR much more than the US.

These economic circumstances and associated broad trends have led to significant global geostrategic changes. The military superiority of the US and the USSR relative to the rest of the world has diminished, due to the economic success and military expansion of several industrialized nations and NICs. Nonetheless, the US and USSR remain the only true superpowers, and they are still essentially comparable to each other in strategic military power. They compete, but avoid direct military hostilities, and share areas of guarded agreement.

In defense and foreign policy, the USSR is cautiously expansionist, but its global position has weakened and its global commitments have been reduced. The Warsaw Pact is intact but weakened, and may be unreliable for military purposes. Although the PRC is not aligned with either the USSR or the US, the Soviet Union is increasingly concerned about Chinese military capabilities.

The United States retains an activist international policy, and continues to participate in a network of alliances, particularly with nations surrounding Eurasia, to contain Soviet expansion. The NATO alliance survives despite continuing internal tensions, and European NATO states have deployed theater ballistic missile defenses in concert with the US. Although Japan has the world's second largest GNP, it still relies on its alliance with the United States and shelters under the US nuclear umbrella for its security. The US provides general political and material support to other non-communist states to promote international commerce and to encourage the development of forces supportive of US interests. The terrorist threat to the United States has increased; Latin American antagonism to the US has declined.

In response to these global circumstances, the United States in the Baseline future has developed a strategy which relies heavily on strategic offensive forces to deter and contain the USSR. This strategy is based on an irreducible ability to inflict unacceptable damage on the USSR after having absorbed a major Soviet strike. In addition, strategic offensive forces are called on to pose a range of threats to Soviet leadership, military forces, and industry. Nevertheless, the US and USSR have agreed to limited arms control agreements which place some restrictions on strategic and tactical nuclear forces. The Anti-Ballistic Missile (ABM) Treaty is still in force. An anti-satellite (ASAT) ban has been added (even though the Soviets have encroached upon the treaty regime by enhancing their ABM capability and widely deploying anti-tactical ballistic missiles (ATBMs) with some ABM capability). While the US has not deployed an ABM system, it has improved its air defense capabilities and uses hardening and mobility to enhance survival of its strategic nuclear force. The US does not emphasize military uses of space and has not developed space weapons, but an SDI research program is retained as a hedge. Outside the central strategic relationship, the US supports its alliance partners with ground, air, and naval forces, many of which are deployed abroad. The US continues to deploy naval forces globally to safeguard its world-wide interests,

and retains moderate sized projection forces at home for contingencies. In general, the US procures non-nuclear rather than nuclear weapons for non-strategic missions when they are cost competitive and militarily effective.

The Increased Competition Future

This future represents an increased threat to the United States, comprised of both a heightened military and political confrontation with the USSR and an additional threat to the US in the Western Hemisphere. Here, protectionism and nationalism have slowed the growth of the non-Soviet bloc economies, particularly those in the Third World, while successful economic reforms have led to a strong economic resurgence in the USSR. These circumstances have contributed to widespread unrest in the Third World, where a number of new left-wing and right-wing extremist governments have taken power.

In geostrategic terms, the US and USSR remain the dominant military powers, and the only superpowers. However, the military power of the USSR has increased relative to the US, and to the rest of the world. Outside the boundaries of the superpowers, widespread deployment of advanced non-nuclear and chemical and biological warfare (CBW) weapons has occurred, as has limited nuclear weapons proliferation. The Soviet Union has redoubled its efforts to expand its own influence around the world, and to reduce the influence of the United States, especially in the Third World. That is where the superpower confrontation is most intense. Of greatest concern to the United States, a major Latin-American state is now ruled by a radical government supported by the Soviet Union. The superpower military relationship is strongly influenced by the fact that strategic defenses have become cost competitive with strategic offenses, and by the virtual disappearance of arms control treaties and limits.

The Soviets have maintained their global commitments and are more disposed to exploit new opportunities. The greatest threats of confrontation between the US and the USSR are in the Third World. In particular, the Soviet Union has supplied the revolutionary, anti-US regime in the Americas with military equipment and infrastructure. Also, the Soviets continue their efforts to isolate the United States from Western Europe. Moderating this aggressiveness somewhat is the fact that the Soviets are increasingly concerned with the military power of the PRC, although formally China maintains a neutralist policy.

In response to this world of increased competition, the US employs an activist international policy relying on forward-based alliances to contain the Soviet Union, particularly in Europe. The US shares its ballistic missile and air defense technologies with its allies. Western Europe, Japan, and some NICs deploy tactical and theater defenses. However, the US has been forced to reduce its commitments in Asia and reposition forces in the United States to meet the threat to the US in the Western Hemisphere. Concerns over terrorist and clandestine threats, and a strengthened isolationist lobby have reduced the ability of the United States to fully sustain its activist international policy.

In the Increased Competition future, the US adds a large component of strategic and theater defense to its offensive forces in order to retain its ability to deter and contain the USSR. The US defense strategy is based on a combination of denial through the use of offensive and defensive forces, and retaliatory strikes against Soviet leadership, military forces, and industry. US strategic defenses support deterrence by reducing Soviet confidence in their first-strike capability. At the same time, Soviet defenses restrict US strategic-strike capability and missions. All arms control agreements have lapsed, and both powers build forces to satisfy their perceived needs.

The Fortress America Future

This future is a moderate-threat case, denoted by a sharp reduction in US commitments outside the Western Hemisphere, and increased US interest in protecting the United States homeland from attack while excluding hostile influences from the Hemisphere. This future postulates a severe depression in the non-communist world, produced by cascading protectionist policies in the Western industrialized countries. The economic isolation of the Soviet bloc has partly insulated it from the global economic troubles, allowing the USSR to increase its relative economic strength.

The US and USSR are the only true superpowers, although the US world role has been significantly reduced. Japan as well as Western Europe has grown in prominence and military strength, and they have demonstrated this strength sufficiently to retain their independence from the USSR, despite the US withdrawal. The US and the USSR exist in a relationship of competitive coexistence. The US withdrawal from Eurasia has reduced the points of contact and friction between the two superpowers. The Soviets are prudently expansionist. Their principal objectives lie in Western Europe, their Eurasian periphery to the south, and the Third World. They show little concern with US power inside its own hemispheric bastion. The Soviets retain their military deployments against the PRC despite its neutralist position, and have an increased interest in neutralizing the rising military power of Japan.

The United States, perceiving Soviet strategic and projection forces as the main threat, has turned to heavy reliance on strategic defenses and maritime forces. Strategic defenses are designed to protect the US as far as possible, and to ensure that US retaliation after an attack will be sufficient to destroy the most important Soviet leadership and recovery assets, despite the effects of extensive Soviet defenses. The US and the Soviets have negotiated a set of arms control agreements reflecting mutual concern for limiting the level of threat against their homelands. The US and the USSR freely use space but refrain from activities which directly affect each other's defensive systems.

Otherwise, US foreign and defense policy is confined to the Western Hemisphere, and there is strong public opposition to any international activity that cannot be related to the defense of the American homeland. In the Western Hemisphere, the US is committed to ensure the survival of friendly governments and to prevent the penetration of Soviet influence.

The Less Hostile USSR Future

The Less Hostile USSR future is a low-threat case in which the USSR, because of a deteriorating internal situation, has arranged a strategic accommodation with the US in order to maintain its threatened position in Eurasia. This future postulates a world economy which is growing robustly with low inflation rates, and continues to integrate, apart from the economic failure and continued isolation of the Soviet bloc. The military, economic, and political power of Japan, Western Europe, and several NICs have increased, especially relative to the USSR. The increasing power of the People's Republic of China poses a major new threat to the Soviet Union. The US and USSR remain the only full-fledged military superpowers, and, due to US restraint, their military power is essentially equal.

In response to these circumstances, the Soviets avoid further efforts at expansion, reduce their security commitments to some degree, seek strategic accommodation with the US, and concentrate on domestic reforms and strengthening their position in Eurasia. Their support for Cuban expansionism in Latin America has greatly diminished. The Soviets are increasingly concerned with the threat of the PRC and with internal Islamic dissidents supported by fundamentalist Moslem states. The technical and economic feasibility of strategic defense together with Soviet economic weakness has led to a broad Soviet acceptance of limitations

on offensive nuclear weapons and an agreed transition to a defense-dominated regime. Remaining Soviet offensive nuclear forces are designed to pose a threat to a limited number of key US and Western European assets, and to a wider set of Asian targets.

The United States maintains an internationalist foreign policy which aims to contain the USSR, support friendly regimes, and encourage global economic expansion and integration. The US continues to support forward-placed alliances to contain the USSR, relying more on general purpose force capabilities as nuclear forces are reduced. Because of the lesser Soviet threat across the board, US overseas forces have been slightly reduced. The NATO structure remains in place, but the Europeans have undertaken a larger share of the conventional defense burden. The US accepts the fact that the USSR has become less hostile, and relies primarily on strategic defense to deny any possible nuclear attack on the US and its allies. Still, the US retains a minimal nuclear offensive retaliatory capability.

A family of arms control agreements has been negotiated to codify and stabilize the new strategic regime. Offensive forces have been cut by treaty; in combination with the strategic defenses deployed by both sides, this severely constrains the number of targets that can be threatened on each side. The remaining US strategic offensive nuclear forces are targeted on Soviet leadership and industry. In addition agreements have been reached reducing INF and conventional forces in Europe, and prohibitions have been negotiated on chemical and biological weapons and on nuclear weapons testing.

Observations on the Futures

In each of the futures constructed for this study, the world remains a dangerous place, and powerful US armed forces are always necessary. The Soviet Union continues to be the most serious military threat to the United States although the degree of threat varies considerably across the four futures. True multipolarity does not emerge, although new centers of power are real possibilities. However, important as they may be in a diplomatic sense and as potential stimuli for conflicts, possible new power centers do not place major new stresses on US security policy in this time frame. At most, a contingency capability to deal with potential new threats is required, and the principal concern is the PRC. Similarly, nuclear weapon proliferation, while possible at a moderate pace, does not pose major new security requirements for the United States.

There is increased pressure on the US due to terrorism in all of the futures. A regional (Western Hemisphere) threat to the United States is important in one future, and causes a diversion of military resources, but such threats are not prominent in most futures. There is some degree of US disengagement from its global commitments in more than one future, due primarily to a US desire to assume a smaller world role. Finally, economic strengths and weaknesses are powerful themes in each of the futures: relative economic performance is an important influence on the overall balance of power, and national economic performance partly determines whether or not perceived national objectives—Soviet or US—can be attained.

Arms control limitations are present in some form in most of the futures. They relate some cases to US and Western desires to reduce the threat of major war and to improve relations with the USSR, and in others to genuine agreement with the USSR to restrain and alter the form of superpower competition.

SECTION THREE: POTENTIAL NUCLEAR WEAPON MISSIONS AND TASKS

Missions in Each Future

Each future, comprising a unique set of global security circumstances, would impose differing requirements for US security policy. Strategies and accompanying potential nuclear weapons missions and tasks

were developed for each future. They are designed to be plausible, in light of postulated global and US domestic circumstances, and to effectively satisfy US security requirements in the context of each future.

Baseline Missions. In the Baseline future, a prominent aim of United States deterrent strategy is to reduce Soviet confidence that they can achieve their very ambitious offensive objectives. In the absence of strategic defenses, this aim is achieved by offensive and passive defensive means alone. Missions to accomplish this aim are designed to ensure the survival and effective launch of a potent US retaliatory force, frustrate Soviet follow-on offensive operations, and assist with the penetration of US retaliatory forces to appropriate Soviet targets of value. This is a daunting task, especially in light of prospective improvements in the ability of the Soviets to assure the prompt launch of their offensive forces; assure the survivability and redundancy of strategic forces, C^3, and essential national command authority; and provide survivable ready and reserve strategic offensive forces.

Because of the difficulty of achieving this aim, the US tries in the Baseline not to wholly deny the success of a Soviet attack, but to reduce Soviet confidence in such an attack. Thus, the Baseline strategy also aims to deter the USSR by threatening to destroy in retaliation the assets most prized by the Soviet regime–political and military leadership, war supporting industry, and post-war recovery capabilities. This entails several potential nuclear weapons missions. The leadership set in particular is extremely difficult to target, because of probable further hardening of command centers and the use of mobile command posts. But, because of its presumed importance to the Soviet decision-making elite, leadership is a very high priority target. Similarly, the US threatens the industrial assets supporting a Soviet Eurasian campaign as this is primarily a fixed, soft target set, the loss of which could influence the outcome of a campaign. Also, the US targets key industrial assets to affect the postwar balance of power. These are still primarily fixed, soft targets that can easily be threatened. This is important as a deterrent as well as operational objective.

Since in the Baseline the US aims to contain the USSR, a number of potential nuclear missions focus on defeating Soviet ground forces in Eurasia and naval forces at sea. The ability to directly impede or stop the Soviet combined armed forces by destroying concentrations of Soviet and Warsaw Pact forces and immediate support assets is very important. This is because the presence of Soviet ballistic missile and air defenses, the active defense of key US and allied military assets, and the greater emphasis on indirect defense capabilities in US and allied strategy reduce the emphasis on the use of nuclear weapons for deliberate escalation. The general approach is to negate Soviet weapons that can destroy high-value US and allied military assets, and use US weapons to destroy high-value Soviet and Warsaw Pact assets needed for their offensive operations. Active theater defenses, both US and Soviet, play an important part even in the Baseline. They serve to protect friendly assets, but also to curtail US and allied access to Soviet and Warsaw Pact targets. This leads to increased efforts to penetrate or circumvent Soviet defenses.

The increased terrorist and clandestine threats to the US from non-state and state-sponsored terrorism in the Baseline result in the establishment of some new missions to protect the US. Beyond the Soviet and terrorist threats, only the PRC is a large enough strategic power to require explicit potential nuclear missions for US forces.

Increased Competition Missions. In the Increased Competition future, the United States strives to support essentially the same defense strategy as in the Baseline vis-à-vis the USSR. However, since strategic defenses are deployed by both sides, the US supports its offensive and passive defensive efforts to deny Soviet strategic offensive success with the addition of active defensive missions. These are designed to facilitate the survival of US national command authority, endurance of the command, control, and communications to its forces, and survival of a significant number of its land-based forces. With the addition of active defenses, fear of a successful, surprise strike able to incapacitate US command and

control is minimized, and protecting US strategic defenses against pre-emptive attack becomes the first concern.

The objective of holding at risk the highest Soviet values—leadership, war-supporting industry, and post-war recovery assets—remains. However, the presence of Soviet strategic defenses complicates these US missions. The containment missions remain much the same as in the Baseline.

In the Increased Competition future, major new threats to the US within the hemisphere are present. The US assigns some new offensive and defensive missions to its forces. Thus, the new threats represent a significant diversion of US resources.

Fortress America Missions. In the Fortress America future, both offensive and defensive missions support the objective of denying the Soviets successful attack options. Since offenses are constrained, a larger part of this burden is borne by defenses. Conversely, US strategic missions are reduced because of both offensive force limitations and Soviet defenses. Notably, the US reduces its allocation of scarce offensive forces against Soviet offensive nuclear forces and their support. Ensuring the survivability of defenses against Soviet attack becomes the first consideration, since degradation of the US defense would undermine the entire strategy.

As in the Baseline, the most valuable Soviet assets are held at risk, but in Fortress America, these missions focus on a restricted set of the most important targets. Since in the Fortress America future the US is not critically interested in the outcome of a Eurasian war, missions for attacking war-supporting industry are deleted.

Because of the US withdrawal from Eurasia in this future, the only containment missions aim at keeping Soviet projection forces out of the vicinity of the Western Hemisphere. This leads to missions to interdict Soviet naval and projection forces. The deletion of containment missions results in a significant reduction in overall mission requirements for this future. However, there remains a contingency requirement to mobilize forces and produce weapons for theater use.

Some missions for the actual defense of key US assets and population appear. This is made feasible by the presence of more effective defenses and substantially reduced offenses.

Less Hostile USSR Missions. In the Less Hostile USSR future, defensive missions are relied on predominantly to deter and deny success to any Soviet strategic attack. Soviet defenses are so effective that the US is able to pose only a marginal retaliatory threat, and does not attempt to attack Soviet nuclear forces. Defending and assuring the continued viability of the defenses takes priority.

Also, because of effective Soviet defenses, US missions to deter by means of holding at risk valuable Soviet assets focus on a few of the most vulnerable targets in this grouping. Containment missions retain a considerable importance in this future, although the presence of defenses complicates them considerably. Missions to actually defend the US from damage from all quarters assume considerable importance.

Categorizing the Missions

As the preceding summary indicates, the United States would be required to undertake many important military missions under each of the global futures and resultant strategies which are postulated. Many of these missions could potentially be met by nuclear weapons. On examining the many missions, we find that they all support one of five broad strategic purposes. These are: deter Soviet attack on the US by denying Soviet military success in a strategic attack; deter or respond to Soviet attack by destroying high-value Soviet assets; prevent Soviet expansion; defend the continental United States (CONUS) and the Western Hemisphere; and deter or defeat other potential aggressor states.

Deter Soviet Attack on the US by Denying Soviet Military Success in a Strategic Attack. This includes all of the offensive and defensive missions which provide direct deterrence by means of operations aimed at frustrating Soviet offensive plans (and deliberately excludes those which provide indirect deterrence or response to attack by threatening or destroying high-value Soviet assets). In the event deterrence fails, these missions are designed to assure the survival of enough of the asset being attacked to allow for the execution of the relevant US strategy.

Listed below are the potential nuclear weapon missions associated with this purpose in all the futures. The letters following the missions indicate the futures where that particular mission is included (A: Baseline, B: Increased Competition, C: Fortress America, and D: Less Hostile USSR).

- Actively and passively defend US defenses (B, C, D).
- Actively and/or passively defend US force execution and coordination assets (A, B, C, D).
- Actively and/or passively defend US strategic offensive forces (A, B, C, D).
- Defend other US assets (B, C, D).
- Suppress or destroy Soviet force execution and coordination assets (A, B, C).
- Selectively suppress or destroy Soviet strategic defenses (A, B, C, D).
- Destroy Soviet counterforce-capable strategic offensive forces (A, B, C).
- Destroy Soviet non-hard target strategic offensive forces, including reserves (A, B, C).
- Destroy the immediate Soviet strategic offensive force infrastructure (A, B).
- Deny the Soviets superiority in the post-war world (A, B, C).

Deter or Respond to Soviet Attack by Destroying High-Value Soviet Assets. Three sets of high-value assets are to be held at risk in the various futures. These are the political and military leadership of the USSR and its allies, together with the facilities and equipment which allow that leadership to control the USSR, the satellite states, and their military forces; the industrial capabilities which allow Soviet military forces to conduct a protracted military campaign in Eurasia, or overseas; and the industrial and other capabilities needed by the Soviet Union to restore its war-waging capabilities following a major war with the United States. The nuclear forces, while a valued asset to the Soviet Union, are accounted for in the missions for the first strategic purpose.

Holding at risk the assets judged to be of high value to the Soviet regime satisfies three US objectives. It provides effective peacetime deterrence; selective destruction of these assets could assist the US to control and limit escalation and exert intra-war leverage; and destruction of these assets in an all-out war would threaten the lives of Soviet leaders, put in doubt the ultimate survival of the Soviet regime, and retard the re-emergence of Soviet military power.

The potential nuclear weapon missions are listed below.

- Hold at risk and provide the capability to destroy or selectively degrade the Soviet and Soviet-allied national level political and military leadership (A, B, C, D).
- Hold at risk and be able to destroy or selectively degrade the Soviet Republic-level political control structure (A, B, C, D).
- Selectively destroy the ability of the Soviet theater-of-military-operations (hereafter, we will use the Soviet acronym TVD)-level military leadership to control military operations (A, B, C).
- Prevent the USSR from restoring its war waging capabilities faster than the United States (A, B, C, D).
- Impede the industrial support for the immediate Soviet war effort in Eurasia (A, B).

Prevent Soviet Expansion. Missions with this objective aim at containing the Soviet Union on the ground in Eurasia and preventing the USSR from projecting military power at sea or overseas. An array of offensive and defensive missions is called for.

- Defend US and allied defenses in the theater (A, B, D).
- Defend high-value US and allied assets in the theater (A, B, D).
- Selectively destroy, suppress, or avoid Soviet and Soviet-allied tactical and theater missile and air defenses (A, B, D).
- Destroy longer-range Soviet and Warsaw Treaty Organization (WTO) offensive theater weapon systems (A, B, D).
- Deter or disrupt the Soviet combined arms offensive in the theater (A, B).
- Contain or destroy Soviet projection force threats (A, B, C, D).

Defend the Continental US and the Western Hemisphere. This reflects the increased importance of threats in and close to the US, and increased attention given to these threats in all futures. Terrorism and clandestine threats pose a significant problem.

The potential nuclear weapon missions and areas where nuclear weapons expertise is needed are as follows.

- Protect the US from clandestine and terrorist attack (A, B, C, D).
- Defend the US from regionally based ground, air, and naval attack (A, B, C, D).

Deter or Defeat Other Potential Aggressor States. The objective here is to deter attack on the United States from non-Soviet strategic threats, and effectively to eliminate aggressor states as factors in the postwar world in the event of major hostilities.

The potential nuclear weapon missions follow.

- Defend the US against non-Soviet strategic attack (B, C, D).
- Hold at risk and be able to destroy the strategic nuclear forces and key leadership of potentially hostile states (A, B, C, D).

Comparison of Tasks in the Futures. The potential nuclear missions identified by the study have been broken down into more definitive components (called tasks here) which relate more closely with actual military activities and can be translated more directly into potential nuclear weapon requirements. For example, the mission of selectively suppressing or destroying Soviet strategic defenses suggests the following tasks: 1) deny operation of Soviet air defense target acquisition and coordination systems for the period of US air operations; 2) destroy or incapacitate for the period of US offensive air operations Soviet interceptor aircraft and surface-to-air missiles along US penetration routes; 3) destroy or suppress the operations of the Soviet ABM early warning and C^3 network for the period of US ballistic missile operations; and 4) destroy or suppress the operation of Soviet ABM weapons for the period of US ballistic missile strikes. The tasks associated with each of the missions are detailed in Appendix B.

Table One displays the number of tasks associated with each strategic purpose for each future. It indicates the distribution of effort within each future, as well as the comparative demands (in terms of numbers of potential nuclear weapon tasks) of the different futures. The tasks which appear most frequently and least frequently indicate which tend always to be required, and which tend to be excluded under certain combinations of external circumstances.

A total of 54 different tasks appears in the four futures; many appear in several futures. The large number of tasks required to deny Soviet military success against the United States (the first strategic purpose), and those needed to contain the Soviet Union in Eurasia (the third strategic purpose), dominate requirements.

TABLE ONE: POTENTIAL NUCLEAR WEAPONS TASKS IN EACH FUTURE

	CATEGORY	(A) BASELINE	(B) INCREASED COMPETITION	(C) FORTRESS AMERICA	(D) LESS HOSTILE USSR
1.	DETER ATTACK BY DENYING SUCCESS	13[a] 28%[b]	17 33%	14 45%	7 27%
2.	DETER BY DESTROYING VALUE	11 23%	11 21%	6 19%	5 19%
3.	PREVENT SOVIET EXPANSION	17 36%	17 33%	4 13%	10 38%
4.	DEFEND CONUS AND WESTERN HEMISPHERE	4 9%	4 8%	4 13%	1 4%
5.	DETER/DEFEAT OTHER HOSTILE STATES	2 4%	3 6%	3 10%	3 12%
	TOTAL TASKS:	47	52	31	26

[a] The numbers represent the tasks in each category in each future.
[b] The percentage represents the size of each category in each future.

Fortress America differs quite substantially in its reallocation of effort away from the containment of the USSR in Eurasia, in accord with its de-emphasis of external commitments.

Commonality of Tasks in the Futures. Many tasks appear in three or even all four of the futures. A "common set" of 14 (26%) tasks appears in all four. Another 22 (41%) tasks occur in three out of the four futures. In essence, the common set defines a minimum strategic policy and set of potential nuclear weapons requirements which, under the assumptions of this study, the United States should expect to confront in any probable future. Adding the 22 tasks that appear in three out of four futures creates an expanded common set of 36 tasks. This describes an expanded strategic policy and set of potential missions and tasks. These pose the potential nuclear requirements most likely to appear thirty years into the future.

The tasks contained in the "common set" and the expanded common set are listed in Appendix C.

The common set of tasks: This set includes only two tasks associated with deterring Soviet strategic attack on the United States by denying Soviet success. The emphasis is instead on deterring or responding to Soviet attack by destroying high-value Soviet assets. This is achieved by threatening the destruction of

the most important elements of Soviet national and republic-level political and military leadership, and key elements of Soviet post-war recovery capabilities. The requirement to destroy Soviet leadership is quite central. In light of probable Soviet active and passive defenses, it appears to pose a formidable technical challenge. The minimum strategy also includes a few tasks associated with destroying the Soviet naval threat to the US and protecting US naval forces, defending the US and Western Hemisphere from regional threats, and detecting clandestine attempts to introduce nuclear weapons into the United States. Finally, it calls for holding at risk non-Soviet states which might pose strategic threats to the United States, if they emerge.

The expanded common set of tasks: Eleven of the additional 22 tasks that appear in three of the futures are associated with deterring attack on the US by denying Soviet success. Broadly speaking, these tasks are fairly evenly divided between defending US military assets, attacking Soviet C^3 and coordination assets, and directly attacking Soviet strategic offensive forces.

A single task, that of attacking Soviet theater military leadership, is added to deterrence by destroying high-value Soviet assets. A single task is also added to deterring or defeating other aggressors, that of defense of the US against attacks by these states.

The remaining emphasis is divided between preventing Soviet expansion (six tasks), and defending the continental US and the Western Hemisphere (three tasks). In the former, tasks are added to defend US and allied assets, attack Soviet theater defenses, and directly attack Soviet intermediate range and theater weapons. In the latter, defense of the US against ballistic, aerodynamic, and ground attack is required as is attack on enemy military capabilities.

Infrequently appearing tasks: Eighteen of the remaining tasks appear in only one or two of the futures. These are deserving of note because of their peculiar importance to a particular future, or because of their probable technological challenge. Only two of these tasks appear in just one future. These eighteen are fairly evenly divided among the first three strategic purposes, but the fourth strategic purpose has only one task (maintaining projection forces), and the fifth has none.

Three of the five tasks required for the first strategic purpose involve attack on Soviet aerodynamic and missile forces, and one is the difficult (but possibly important) task of preventing dissemination of the Soviet Emergency Action Message for thirty minutes. The means of accomplishing this last task are not clear, and this is a good illustration of the need for technical innovation.

The five tasks required for the second strategic purpose contain three associated with destruction of additional elements of leadership C^3, and two which involve destruction of Soviet industry and energy distribution networks.

The largest single group of tasks (six) is that required to prevent Soviet expansion. These tasks are related to the prevention of Soviet movement of assets to the fronts and destruction of engaged military forces.

Collectively, even though these tasks are less frequent they present a wide range of requirements and some unique but important problems.

Observations on Missions and Tasks. The potential missions and tasks for nuclear weapons in the Baseline are to a considerable degree an evolution from the security policy and weapons missions of today. Where missions disappear in other futures (e.g. attempting to pre-empt a Soviet strike) it tends to be because US strategy changes have made them unnecessary, or because increased cost or technical difficulty of achieving them have made them unacceptable. Where missions are added, it is because the threat to the US has grown, or because new weapons technology and mission approaches have become necessary to achieve US security objectives.

The presence or absence of strategic defenses, and whether or not they are combined with limitations on offensive forces, strongly influences the shape and number of potential nuclear weapons missions. Passive defenses tend to be used throughout, in order to allow the US to retain a viable strategy in the face of improved Soviet offensive capabilities. Active defenses, when used, are relied on to deny enemy success or provide survival of various US assets. Similarly, Soviet defenses, if projected, would reduce the success and increase the difficulty of US offensive operations. Where offensive weapons are limited in number and defenses are allowed, the effect is to shift more of the burden of deterrence to protecting US assets and denying Soviet objectives.

Overall, postulated US military missions and tasks tend to be much more difficult to achieve. As a result, there is continued pressure for more effective, and probably more sophisticated, weapons and perhaps for new approaches to accomplishing the missions. New and innovative nuclear and non-nuclear weapons designs might be called upon to contribute to meeting these new challenges.

Finally, the futures tend to call for improvement in the ability of the US to fight a protracted war, survive a nuclear battle, and restore both its industrial and military capabilities after the conflict.

SECTION FOUR: CONCLUSIONS

The World of the Future

The Global Environment. Foreseeable changes over thirty years are unlikely to bring a revolutionary change in the global environment. In each of the futures powerful US armed forces are necessary, and many potential roles for nuclear weapons persist. The Soviet Union continues to be the most serious military threat to the United States, although the degree of threat could vary considerably.

New threats of significance to US national security interests are plausible, although they will not take on the dimensions of the Soviet threat. Possible threats of this kind identified in the study include a militant Islamic coalition, possibly armed with chemical, biological, or nuclear weapons; a major hostile state in the Americas aligned with the Soviet Union; and a modernized and hostile People's Republic of China.

US Policy. The United States is likely to retain an activist, internationalist role in world affairs, and continue to bear the burden of leadership of the Western alliance. The United States would continue to procure and maintain first-rate military forces and weaponry able to protect US and allied interests in low-intensity conflict, small-scale and large-scale conventional war, and major wars on several fronts utilizing the most modern weapons.

A less probable development is that the reservations in the US policy about continuing America's leading international role could lead to a voluntary withdrawal of US military forces and political commitments into the Western Hemisphere. This would lead to a major restructuring of US defense policy and military forces, including retrenchment on strategic offensive and defensive forces, and on forces to deny the projection of hostile influence into the Hemisphere.

Arms Control. Arms control is popularly perceived as a principal method of reducing superpower tensions. In this sense, arms control has become a political imperative for the United States. Its pursuit is likely to endure, within a narrow range bounded by the need to explore every opportunity to reduce tensions, and the competitive nature of US-Soviet relations. Arms control agreements along the lines of those presently in place and under negotiation are likely to continue.

Military Technologies. No changes in either nuclear or non-nuclear weapons technologies that would fundamentally alter the art of war or the balance of military power are seen as probable. Important incremental developments are possible, with weapons of both types evolving which respond well to emerging new targeting requirements. A similar evolutionary development is likely in the area of major weapons delivery vehicles and propulsion technology. The most dramatic advances are likely in weapons-related computing and sensing technologies, improving the ability to identify and strike targets at great ranges or speeds. Thus, non-nuclear weapons would become more competitive for missions where kill (possibly repairable) of a point target, with limited collateral damage, is desirable.

The major foreseeable technology development that would have a major impact on the military balance, the conduct of war, and US weapons development would be the emergence of promising SDI technologies accompanied with a political decision to deploy them. This could lead to the development of a suite of new defensive and offensive weapons. Developments in other areas of science and technology, not now foreseen, could have major impact as well (e.g. weapons developed through bioengineering).

Nuclear Weapons Roles in the Futures

The Soviet Union continues to pose a large and technically sophisticated threat to the US. That threat shapes the general size and characteristics of US military forces and weapons requirements. Possible additions to the Soviet threat, such as the emergence of new centers of power and nuclear weapons proliferation, tend to add quantitatively but not qualitatively to the requirements already posed by the presence of the Soviet Union.

The potential mission requirements associated with the Baseline future are recognizable as developments from today's requirements. Each of the other futures has requirements which are clearly variations from the Baseline, with missions either added or subtracted to meet special circumstances or differing strategic concepts. Missions tend to disappear as a result of changes in US strategy which make them unnecessary, or when they become so difficult that achieving them appears to be a poor investment of resources. Missions are added when the threat grows or changes character, or the US changes its strategy to achieve its objectives with a new approach.

Specific impacts on four areas of importance to the nuclear weapons program should be noted.

Nuclear Weapons Employment Policy. Current nuclear targeting policy establishes ambitious goals for target damage and coverage, while the evolving Soviet target set has become much more stressing. This trend is likely to continue. A revision in nuclear targeting policy could result in a less ambitious set of goals; however, the Soviet military and leadership target sets, which probably will remain priority assets, will continue to demand weapons of greater capability (e.g. tailored effects, etc.).

Introduction of Advanced Strategic Defenses. The potential for widespread deployment of advanced Soviet ballistic missile defense (BMD) systems will be present throughout the thirty-year period and beyond. The deployment of BMD, more effective dual-capable surface-to-air missiles (SAMs) or Soviet SDI systems would stress even further the ability of the US to place at risk essential Soviet targets. Conversely, US SDI deployments could lead the US to choose less ambitious offensive targeting goals, and so lead to less demanding nuclear weapons requirements.

The Political-Military Attractiveness of Non-Nuclear Weapons. This issue will continue to influence the debate over Western security requirements. Regardless of whether the "revolution" in advanced

conventional weapons ever takes place, politicians will continue to support and lend resources to technologies which might shift reliance away from nuclear weapons. Military strategy–the desire to maintain attack options with limited collateral damage, to stay below the nuclear threshold, or to raise the nuclear threshold–will also continue to argue for significant non-nuclear weapons options.* However, there are requirements for which nuclear weapons appear to be the only effective choice, or where they are likely to remain the weapon of choice (e.g. for assured destruction of a target which would preclude repair, or for cost effectiveness).**

Growth in the Target Base. In several future projections, there are plausible cases made for significant growth in the potential nuclear weapons target base. Weapons may be sought which could address the problem of growing numbers of targets with limited expansion in delivery systems or constrained nuclear warheads required to place the target set at risk (e.g. electromagnetic pulse (EMP) or other special effects area weapons).

Weapons Characteristics

Potential nuclear weapons requirements imply a wide spectrum of potential targets. Many of these are likely to continue to be area targets, and there will also probably be many point targets, and soft as well as very hard targets. There may be a trend in some missions and tasks towards attacking assets (e.g. missiles, command posts) that are more mobile, dispersed, and more difficult to locate. Achieving some of the missions would imply attacking (or defending) assets which are located on the ground or underground, at sea, in the atmosphere, and in space.

Potential nuclear weapons missions tend to be more difficult to achieve across the board in the futures. Soviet targets become harder, more mobile, more dispersed, and better defended. This creates pressure for more effective and probably more sophisticated weapons, and perhaps for innovative ways to achieve the missions. New and innovative nuclear weapons designs may be able to contribute to meeting some of these demands. The alternative, where the strategic situation permits, is to abandon those missions which appear too difficult to achieve, even though, historically, it has proven difficult to admit that missions are no longer feasible.

Non-nuclear weapons appear to be competitive with nuclear weapons for some, but by no means all, tasks. Detailed comparison of nuclear and non-nuclear technologies which might accomplish each of the missions and tasks identified in the study is required to evaluate the future relationship of nuclear and non-nuclear weapons.

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* But attack by the US on the Soviet homeland with non-nuclear weapons could well result in Soviet nuclear retaliation if the Soviets did not have an effective non-nuclear option, or did not choose to follow US escalation control thinking.

** Also, as long at the USSR possesses nuclear weapons it is inconceivable that the US will do away with them completely.

APPENDIX A
SUPPORTING DOCUMENTATION

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APPENDIX B
TASKS AND SUPPORT MEASURES ASSOCIATED WITH EACH POTENTIAL NUCLEAR WEAPON MISSION

(A) Baseline; (B) Increased Competition; (C) Fortress America; (D) Less Hostile USSR

1. DETER SOVIET STRATEGIC ATTACK ON THE US BY DENYING MILITARY SUCCESS

MISSION 1.1. (B, C, D): Actively and passively defend US defenses.

- Task 1.1.1. (B, C, D): Actively defend the space-based and ground-based elements of the defense system.

  Support measures 1.1. (B, C, D): Passively defend US defenses and their essential support.

MISSION 1.2. (A, B, C, D): Actively and/or passively defend US force execution and coordination assets.

- Task 1.2.1. (B, C, D): Actively defend US national command authority (NCA), strategic offensive forces (SOF) C^3, and other force execution and coordination assets from ballistic missile and aerodynamic attack.

  Support measures 1.2. (A, B, C, D): Passively defend US NCA, SOF C^3, and other force execution assets from ballistic missile and aerodynamic attack.

MISSION 1.3. (A, B, C, D): Actively and/or passively defend US strategic offensive forces.

- Task 1.3.1. (B, C, D): Actively defend US strategic offensive forces and critical associated assets from ballistic missile and aerodynamic attack.

  Support measures 1.3. (A, B, C, D): Passively defend US strategic offensive forces from ballistic missile and aerodynamic attack.

MISSION 1.4. (B, C, D): Defend other US assets.

- Task 1.4.1. (B, C, D): Defend against nuclear delivery vehicles and warheads targeted on US leadership, other military forces, and war supporting industry. Provide collateral defense of US population centers.

- Task 1.4.2. (B, C): Reconstitute defenses and continue to defend the US while war-waging capabilities are being restored and repaired.

  Support measures 1.4.1. (B, C, D): Passively defend US leadership, other military forces, and war supporting industry, and provide protection to US population.

MISSION 1.5. (A, B, C): Suppress or destroy Soviet force execution and coordination assets.

- Task 1.5.1. (A): Prevent dissemination of Soviet emergency action message for about 30 minutes.
- Task 1.5.2. (A, B, C): Promptly suppress SOF-related C^3 and reconnaissance assets to inhibit Soviet nuclear strike execution and coordination.
- Task 1.5.3. (A, B, C): Continue to suppress or destroy Soviet C^3 and reconnaissance assets needed to conduct trans-strike and post-strike operations.

MISSION 1.6. (A, B, C, D): Selectively suppress or destroy Soviet strategic defenses.

- Task 1.6.1. (A, B, C): Deny operation of Soviet air defense target acquisition and coordination systems for the period of US offensive air operations.
- Task 1.6.2. (A, B, C, limited D): Destroy or incapacitate for the period of US offensive air operations (a small number of: D) Soviet interceptor aircraft, and surface-to-air missiles along US penetration routes.
- Task 1.6.3. (A, B, C): Destroy or suppress the operation of ABM early warning and C^3 network for the period of US ballistic missile operations.
- Task 1.6.4. (A, B, C, limited D): Destroy or suppress the operation of Soviet ABM weapons (to create a corridor to a small number of targets: D) for the period of US ballistic missile strikes.

MISSION 1.7. (A, B, C): Destroy prompt, (generated) Soviet counterforce-capable strategic offensive forces.

- Task 1.7.1. (A, B, limited C): Selectively destroy (a small number of: C) Soviet SOF capable of counterforce attacks and other Soviet SOF assets that threaten US strategic offensive and defensive forces and their NCA and supporting C^3.

MISSION 1.8. (A, B, C): Destroy delayed (and non-generated) Soviet non-hard target strategic offensive forces, including reserves.

- Task 1.8.1. (A, B, limited C): Promptly destroy (a small number of: C) known and probable static locations and key fixed nodes of the Soviet mobile or moveable intercontinental ballistic missile (ICBM) force.
- Task 1.8.2. (A, B): Detect and destroy mobile or moveable strategic missiles and launchers throughout the course of the war.
- Task 1.8.3. (A, B, limited C): Destroy or degrade (a small number of: C) air-breathing forces before they can leave their bases.

MISSION 1.9. (A, B): Destroy the immediate Soviet strategic offensive force infrastructure.

- Task 1.9.1. (A, B): Destroy or deny for the period of the war the use of the ICBM and submarine-launched ballistic missile (SLBM) infrastructure.

- Task 1.9.2. (A, B): Destroy or permanently incapacitate the operating bases and immediate support facilities of the air-breathing forces.

MISSION 1.10. (A, B, C): Deny the USSR superiority in the post-war world.

Support measures 1.10.1. (B, C): Maintain effective air and missile defenses during protracted strategic war.

Support measures 1.10.2. (A, B, C): Ensure the survival of a strategic reserve force and essential NCA and C^3I in the post-war period.

Support measures 1.10.3. (B, C): Reconstitute and rehabilitate unused and/or damaged offensive nuclear weapons.

2. DETER OR RESPOND TO SOVIET ATTACK BY DESTROYING HIGH-VALUE SOVIET ASSETS

MISSION 2.1. (A, B, C, D): Hold at risk and provide the capability to destroy or selectively degrade the Soviet and Soviet allied national level political and military leadership.

- Task 2.1.1. (A, B): Destroy selected elements of the C^3 structure of the national political leadership.

- Task 2.1.2. (A, B): Destroy selected elements of the C^3 structure of the national military leadership.

- Task 2.1.3. (A, B, limited C, D): Destroy (the most important elements of: C, D) the national political leadership.

- Task 2.1.4. (A, B, limited C, D): Destroy (the most important elements of: C, D) the national military leadership.

MISSION 2.2. (A, B, C, D): Hold at risk and be able to destroy or selectively degrade the Soviet republic-level political control structure.

- Task 2.2.1. (A, B, limited C, D): Selectively destroy (the most important: C, D) republic-level political leadership and its wartime operations facilities.

MISSION 2.3. (A, B, C): Selectively destroy the ability of the Soviet TVD-level military leadership to control military operations.

- Task 2.3.1. (A, B): Disrupt or destroy the C^3 facilities and operations of the TVD-level military leadership.

- Task 2.3.2. (A, B, C): Destroy the major command posts of the TVD-level military leadership as they become operational.

MISSION 2.4. (A, B, C, D): Prevent the USSR from restoring its war-waging capabilities faster than the US.

- Task 2.4.1. (A, B, C, limited D): Disrupt or destroy (the most important elements of: D) the nuclear weapon research, development, testing, engineering, production, and storage complex.

- Task 2.4.2. (A, B, C, limited D): Destroy (the most important elements of: D) the Soviet strategic nuclear delivery vehicle production complex.

- Task 2.4.3. (A, B): Destroy key Soviet war-related primary industries, and major factories directly producing military equipment and supplies for Eurasian war.

  Support measures 2.4.1. (B): Improve the resiliency of key US nuclear weapons production and military/civilian support networks.

  Support measures 2.4.2. (D): Maintain an active US strategic offensive and defensive R&D program.

  Support measures 2.4.3. (D): Maintain a mobilization plan for US general purpose forces, and an adequate GPF infrastructure for mobilization.

  Support measures 2.4.4. (D): Reconstitute US and allied defenses to protect the restoration and repair of our war-waging capabilities.

MISSION 2.5. (A, B): Impede the industrial support for the immediate Soviet war effort in Eurasia.

- Task 2.5.1. (A, B): Destroy or disrupt for the period of the war the Soviet energy production and distribution network that supplies war production factories.

- Task 2.5.2. (A, B, D): Destroy key nodes in the Soviet transportation system.

- Task 2.5.3. (A, B, D): Destroy military end-item stockpiles, fabrication facilities, etc.

3. PREVENT SOVIET EXPANSION

MISSION 3.1. (A, B, C, D): Defend US and allied defenses in the theater.

- Task 3.1.1. (A, B, D): Actively defend space-based and ground-based elements of the theater air defense and ATBM network from ballistic missile and aerodynamic attack.

  Support measures 3.1. (A, B, D): Passively defend US/allied theater defenses.

  Support measures 3.1. (C): Design US global defense systems to engage threats to countries of interest to the US.

MISSION 3.2. (A, B, C, D): Defend high-value US and allied assets in the theater.

- Task 3.2.1. (A, B, D): Actively defend high-value US theater and allied assets against ballistic missile and aerodynamic attack.

  Support measures 3.2. (A, B, D): Reduce the vulnerability of high-value US/allied military assets.

  Support measures 3.2. (C): Maintain technical capabilities and an industrial base that can rapidly begin production of theater defense systems.

MISSION 3.3. (A, B, D): Selectively destroy, suppress, or avoid Soviet and Soviet-allied tactical/theater missile and air defenses.

- Task 3.3.1. (A, B, extended D): Suppress and interrupt the C^3 for the ATBM and theater/tactical air defense systems (A, B) (or destroy on-launcher ATBM and air defense weapons, during the period of US/allied TNF operations-D).

- Task 3.3.2. (A, B, D): Destroy on-launcher ATBM and air-defense weapons during the period of US/allied offensive operations.

  Support measures 3.3. (A, B, D): Develop US/allied theater offensive weapons capable of penetrating or avoiding Soviet ATBM and theater/tactical air defenses.

MISSION 3.4. (A, B, C, D): Destroy longer-range Soviet/WTO offensive theater weapon systems.

- Task 3.4.1. (A, B, D): Destroy the launchers of Soviet short-range and intermediate-range ballistic missiles and aircraft.

- Task 3.4.2. (A, B, D): Destroy combat support assets needed by the Soviets to reconstitute or reuse their longer-range theater offensive weapons.

Support measures 3.4. (C): Maintain technical capabilities and an industrial base that can rapidly begin production of theater offensive missile and aerodynamic systems.

MISSION 3.5. (A, B, C): Deter or disrupt the Soviet combined arms offensive in the theater.

- Task 3.5.1. (A, B): Disrupt the in-theater C^3 of Soviet/WTO forces.
- Task 3.5.2. (A, B): Inside the USSR, destroy or degrade the performance of large groups of troops and equipment in assembly and storage areas.
- Task 3.5.3. (A, B): Inhibit the movement of major field forces toward the fighting fronts.
- Task 3.5.4. (A, B): Delay and disrupt the progress of forces to the fighting fronts, and prevent the reinforcement of front-line units.
- Task 3.5.5. (A, B): Destroy large concentrations of troops, artillery, close support aircraft, and armor in the battle area.
- Task 3.5.6. (A, B): Destroy or degrade the fighting ability of engaged infantry and/or armored forces that threaten to break through allied lines, and of concentrated enemy forces that have broken through.
- Task 3.5.7. (A, B): Destroy a spectrum of small, discrete military and other target sets for deliberate escalation control purposes.

Support measures 3.5. (C): Maintain the technical capabilities and industrial base that rapidly begin production of theater offensive systems.

MISSION 3.6. (A, B, C, D): Contain or destroy Soviet projection force threats.

- Task 3.6.1. (A, B, C, D): Attack and destroy Soviet naval C^3, surveillance, etc.
- Task 3.6.2. (A, B, C, D): Contain or destroy deployed Soviet naval nuclear forces which pose a threat to US and allied forces or assets. This task is enormous in scope. An anti-nuclear powered ballistic-missile submarine (SSBN) campaign will require fighting through a layered defense, both surface and sub-surface, destruction of the nuclear-powered attack submarine (SSN) escorts, and detection, localization, and destruction of the SSBNs. Complicate the problem further with under-ice bastions. In addition, nuclear cruise-missile-firing SSNs will pose a significant threat to both continental US and theatre forces.
- Task 3.6.3. (A, B, C, D): Destroy homeland and overseas naval facilities used to support and reconstitute Soviet naval forces.
- Task 3.6.4. (A, B, C, D): Actively defend US naval assets from aerodynamic, ballistic missile, and underwater attack.

4. DEFEND CONUS AND THE WESTERN HEMISPHERE FROM REGIONAL THREATS

MISSION 4.1. (A, B, C, D): Protect the US from clandestine and terrorist attack.

- Task 4.1.1. (A, B, C, D): Deter or detect clandestine attempts to introduce nuclear weapons into the US.

  Support measures 4.1. (A, B, C, D): Reduce the vulnerability of key US military and civil systems to clandestine or terrorist attacks using nuclear weapons.

MISSION 4.2. (A, B, extended C, D): Defend the US from regionally based ground, air, and naval attack (and be able to project military power within the Western Hemisphere: C, D).

- Task 4.2.1. (A, B, C): Defend the US against ballistic missile and aerodynamic attack from the south.
- Task 4.2.2. (A, B, C): Defend the US from ground forces attack from the south.
- Task 4.2.3. (A, B, C): Destroy the key military capabilities of Soviet allies and other hostile states in the Western Hemisphere.
- Task 4.2.4. (D): Maintain general purpose and nuclear projection forces in the US superior to all possible combinations of potentially hostile states in the Western Hemisphere.

5. DETER OR DEFEAT NON-SOVIET STRATEGIC THREATS

MISSION 5.1. (B, C, D): Defend the US against non-Soviet strategic attack.

- Task 5.1.1. (B, C, D): Actively defend nuclear forces, leadership, other military forces, war supporting industry, and population centers against non-Soviet ballistic missile and aerodynamic attack.

MISSION 5.2. (A, B, C, D): Hold at risk and be able to destroy the strategic nuclear forces and key leadership of potentially hostile states.

- Task 5.2.1. (A, B, C, D): Destroy the top-level PRC political leadership and its key political and military C^3 facilities.
- Task 5.2.2. (A, B, C, D): Destroy the PRC strategic nuclear forces, their immediate support and reserves, and the nuclear weapons research, development, testing, and evaluation (RDT&E) and production complex.

APPENDIX C
COMMONALITY OF TASKS IN THE FOUR FUTURES

(A) Baseline; (B) Increased Competition; (C) Fortress America; (D) Less Hostile USSR

THE COMMON SET OF TASKS (APPEAR IN ALL FOUR FUTURES)

Category One (Deter Soviet Attack on the US by Denying Soviet Military Success in a Strategic Attack)

- Destroy or incapacitate for the period of US offensive air operations (a small number of: D) Soviet interceptor aircraft and surface-to-air missiles along US penetration routes.
- Destroy or suppress the operation of Soviet ABM weapons (to create a corridor to a small number of targets: D) for the period of US ballistic missile strikes.

Category Two (Deter or Respond to Soviet Attack by Destroying High-Value Soviet Assets)

- Destroy (the most important elements of: C, D) the national political leadership.
- Destroy (the most important elements of: C, D) the national military leadership.
- Selectively destroy (the most important: C, D) republic-level political leadership and its wartime operations facilities.
- Disrupt or destroy (the most important elements of: D) the nuclear weapons research, development, testing, engineering, and production complex.
- Destroy (the most important elements of: D) the S oviet strategic nuclear delivery vehicle production complex.

Category Three (Prevent Soviet Expansion)

- Attack and destroy Soviet naval C^3, surveillance, etc.
- Contain or destroy deployed Soviet naval nuclear forces which pose a threat to US and allied forces or assets.
- Destroy homeland and overseas naval facilities used to support and reconstitute Soviet naval forces.
- Actively defend US naval assets from aerodynamic, ballistic missile, and underwater attack.

Category Four (Defend CONUS and the Western Hemisphere)

- Deter or detect clandestine attempts to introduce nuclear weapons into the US.

Category Five (Deter or Defeat other Potential Aggressor States)

- Destroy the top-level PRC political leadership and its key political and military C^3 facilities.
- Destroy the PRC strategic nuclear forces, their immediate support and reserves, and the nuclear weapons RDT&E and production complex.

FREQUENTLY OCCURRING TASKS (APPEAR IN THREE FUTURES)

Category One (Deter Soviet Attack on the US by Denying Soviet Military Success in a Strategic Attack)

- (B, C, D) Actively defend the space-based and ground-based elements of the defense system.
- (B, C, D) Actively defend US NCA, SOF C^3, and other force execution and coordination assets from ballistic missile and aerodynamic attack.
- (B, C, D) Actively defend US strategic offensive forces and critical associated assets from ballistic missile and aerodynamic attack.
- (B, C, D) Defend against nuclear delivery vehicles and warheads targeted on US leadership, other military forces, and war supporting industry. Provide collateral defense of US population centers.
- (A, B, C) Promptly suppress SOF-related C^3 and reconnaissance assets to inhibit Soviet nuclear strike execution and coordination.
- (A, B, C) Continue to suppress or destroy Soviet C^3 and reconnaissance assets needed to conduct trans-strike and post-strike operations.
- (A, B, C) Deny operation of Soviet air defense target acquisition and coordination systems for the period of US offensive air operations.
- (A, B, C) Destroy or suppress the operation of ABM early warning and C^3 network for the period of US ballistic missile operations.
- (A, B, limited C) Selectively destroy (a small number of: C) Soviet SOF capable of counter-force attacks and other Soviet SOF assets that threaten US strategic offensive and defensive forces and their NCA and C^3.
- (A, B, limited C) Promptly destroy (a small number of: C) known and probable static locations and key fixed nodes of the Soviet mobile or moveable ICBM and SLBM force.
- (A, B, limited C) Destroy or degrade (a small number of: C) air-breathing forces before they can leave their bases.

Category Two (Deter or Respond to Soviet Attack by Destroying High-Value Soviet Assets)

- (A, B, C) Destroy the major command posts of the TVD-level military leadership as they become operational.

Category Three (Prevent Soviet Expansion)

- (A, B, D) Actively defend space-based and ground-based elements of the theater air defense and ATBM network from ballistic missile and aerodynamic attack.
- (A, B, D) Actively defend high-value US and allied assets against ballistic missile and aerodynamic attack.
- (A, B, extended-D) Suppress and interrupt the C^3 for the ATBM and theater/tactical air defense systems (A, B) (or destroy on-launcher ATBM and air defense weapons, during the period of US/allied TNF operations-D).
- (A, B, D) Destroy on-launcher ATBM and air-defense weapons during the period of US/allied offensive operations.
- (A, B, D) Destroy the launchers of Soviet short-range and intermediate-range ballistic missiles and aircraft.

- (A, B, D) Destroy combat support assets needed by the Soviets to reconstitute or reuse their longer-range theater offensive weapons.

Category Four (Defend CONUS and the Western Hemisphere)

- (A, B, C) Defend the US against ballistic missile and aerodynamic attack from the south.
- (A, B, C) Defend the US from ground forces attack from the south.
- (A, B, C) Destroy the key military capabilities of Soviet allies and other hostile states in the Western Hemisphere.

Category Five (Deter or Defeat other Potential Aggressor States)

- (B, C, D) Actively defend nuclear forces, leadership. other military forces, war supporting industry, and population centers against non-Soviet ballistic missile and aerodynamic attack.

INFREQUENTLY OCCURRING TASKS (APPEAR IN ONE OR TWO FUTURES)

Category One (Deter Soviet Attack on the US by Denying Soviet Military Success in a Strategic Attack)

- (A, B) Detect and destroy mobile or moveable strategic missiles and launchers throughout the course of the war.
- (A, B) Destroy or deny for the period of the war the use of the ICBM and SLBM infrastructure.
- (A, B) Destroy or permanently incapacitate the operating bases and immediate support facilities of the air-breathing forces.
- (B, C) Reconstitute defenses and continue to defend the US while war-waging capabilities are being restored and repaired.
- (A) Prevent dissemination of Soviet emergency action message for about 30 minutes.

Category Two (Deter or Respond to Soviet Attack by Destroying High-Value Soviet Assets)

- (A, B) Destroy selected elements of the C^3 structure of the national political leadership.
- (A, B) Destroy selected elements of the C^3 structure of the national military leadership.
- (A, B) Disrupt or destroy the C^3 facilities and operations of the TVD-level military leadership.
- (A, B) Destroy key Soviet war-related primary industries, and major factories directly producing military equipment and supplies for Eurasian war.
- (A, B) Destroy or disrupt for the period of the war the Soviet energy production and distribution network that supplies war prodution factories.

Category Three (Prevent Soviet Expansion)

- (A, B) Disrupt the in-theater C^3 of Soviet/WTO forces.
- (A, B) Inside the USSR, destroy or degrade the performance of large groups of troops and equipment in assembly and storage areas.
- (A, B) Inhibit the movement of major field forces toward the fighting fronts.
- (A, B) Delay and disrupt the progress of forces to the fighting fronts, and prevent the reinforcement of front-line units.

- (A, B) Destroy large concentrations of troops, artillery, close support aircraft, and armor in the battle area.
- (A, B) Destroy or degrade the fighting ability of engaged infantry and/or armored forces that threaten to break through allied lines, and of concentrated enemy forces that have broken through.
- (A, B) Destroy a spectrum of small, discrete military and other target sets for deliberate escalation control purposes.

Category Four (Defend CONUS and the Western Hemisphere)

- (D) Maintain general purpose and nuclear projection forces in the US superior to all possible combinations of potentially hostile states in the Western Hemisphere.

Category Five (Deter or Defeat other Potential Aggressor States)

- none applicable

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