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STRATEGIC ARMS LIMITATIONS: AN ANALYSIS OF FACTORS THAT IMPACT ARMS CONTROL PROGRESS AND WEAPON SYSTEM SELECTION

The University of Oklahoma PH.D. 1981

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

STRATEGIC ARMS LIMITATIONS: AN ANALYSIS OF FACTORS THAT IMPACT ARMS CONTROL PROGRESS AND WEAPON SYSTEM SELECTION

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

THOMAS PATTON

Norman, Oklahoma

1981

STRATEGIC ARMS LIMITATIONS: AN ANALYSIS OF FACTORS THAT IMPACT ARMS CONTROL PROGRESS AND WEAPON SYSTEM SELECTION

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ACKNOWLEDGEMENTS

There were a great many people who were supportive in this examination of endurance. This dissertation is dedicated to them.

To Mr. Robins, who instigated it, and Lara, who supported it. To Dr. Jackson, who constantly said "Get with it." To Donnie I. Huggins, who thought that lack of a pencil was no excuse. To Dr. "Mom" Ballard, who managed to squeeze the last drop but was always willing to go another mile. To my family, particularly my brother who would have been proud.

To Myra Dupree, who is in a category all by herself. Myra typed at least a jillion words and made all of ten typos. I am convinced that she should be a contract specialist. She always wanted to place one!

Lastly to my beloved Barbara, who understood what was required, never complained, and managed to hold it all together. She deserves the credit!

FOREWARD

This dissertation in terms of National Security Classification will be unclassified. The information collection process involved telephone conversations, written requests for certain documents, and personal conversations with many individuals who have participated or are currently involved in these programs. Because of the currency of the MX debate and its highly controversial nature, the anonymity of these sources has been protected. Statements addressing items that may not be common knowledge and are not referenced are based on these sources. The referenced information and data utilized are obtained from sources which are readily available to anyone in most university libraries or designated as unrestricted access in case of some government agency documentation. Weapons system technical characteristics and operational capabilities are obtained from such sources as Janes Weapons Systems, Stockholm International Peace Research Institute, and other recognized commercially available scientific-technical publications.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS iii

FOREWARD iv

LIST OF TABLES viii

LIST OF FIGURES. ix

Chapter

I. PROBLEM IDENTIFICATION AND RESEARCH METHODOLOGY. 1

Introduction 1
The Triad System
Threat ICBM Strategic Forces
Research Purposes. 10
Research Methodology 11
Applied Policy Analysis
Policy Context Description
Identification of Alternatives
Evaluation Criteria
Evaluation/Comparison/Implementatility of Alternatives
Recommendations
Summary. 24

II. INSTITUTIONAL ARRANGEMENTS 27

Introduction 27
Central Role of the President. 27
National Security Council. 29
NSC Department Roles
Presidential Advisors. 36
Decision Models. 39
Rational Actor
Bureaucratic Model

III. NATIONAL SECURITY STRUCTURE UTILIZATION AND DECISION MODELS APPLIED. 44

NSC Utilization and Decision Model Applied . 44
Johnson Administration
Nixon Administration

Chapter Page

Carter Administration
Reagan Administration
Summary. 60

IV. FACTORS THAT IMPACT PROGRESS IN ARMS CONTROL . 65

Introduction 65
Technology Creep 66
MIRV
Development
Concept of Deterrence. 73
U.S.-Soviet Strategy
Stability
Deterrence Theory Framework. 78
Impacts of Arms Control. 81
Credibility
Negotiations 83
Negotiation Problems
Linkage
Back Channel Communications
Verification
Treaty Ambiguities 90
Reliability of Verification. 92
Summary. 94

V. WEAPON SYSTEM ALTERNATIVES FOR THE STRATEGIC ICBM FORCE 99

Introduction 99
Fixed-Base ICBMs 100
Titan II
Minuteman II and III
Mobile ICBM - MX 105
Suitable Basing Areas
Basing Modes
Horizontal Basing Mode
Antiballistic Missile System 116
MX Warhead Destructive Capabilities. 119
Summary

VI. EVALUATION AND COMPARISON OF ALTERNATIVES. . . 125

Introduction 125
Evaluation of Alternatives 129
Common Fixed-Based Criteria
Environmental Impacts
Vulnerability
Verifiability
Titan II
Deterrent Potential
Social and Political Impacts

Chapter Page

Minuteman
Deterrent Potential
Social and Political Impacts
MX
Deterrent Potential
Accuracy
Environmental Impacts
Restorability
Resources Required
Vulnerability
Verifiability
Social and Political Impacts
MX Program Cost
Antiballistic Missiles
Weapon System Evaluation Summary
Alternative Courses of Action. 173
Do Nothing
Deploy Additional Fixed-Based Systems
Convert Minuteman to Modile Mode
Deploy MX
MX in Minuteman Fields
MX with LoAD
Summary. 181

VII. CONCLUSIONS. 185

Introduction 185
Research Questions
Methodology
Findings 187
Decision Making and Negotiations
Deterrence
Technology Creep
Additional Research. 197
Recommendations. 198

BIBLIOGRAPHY 208

APPENDIX 1 223

APPENDIX 2 225

APPENDIX 3 238

APPENDIX 4 245

GLOSSERY 258

STRATEGIC ARMS LIMITATIONS: AN ANALYSIS OF FACTORS THAT IMPACT ARMS CONTROL PROGRESS AND WEAPON SYSTEM SELECTION

CHAPTER I

PROBLEM IDENTIFICATION AND RESEARCH METHODOLOGY

Introduction

Strategic arms limitations are not intermittent elements but integral aspects of foreign policy and national security. Recognition of the increasing role of arms control in foreign policy is depicted by the number of arms control agreements that have transpired since 1959 (see table 1). The majority of these treaties were completed during the decade of the seventies and are bilateral agreements between the United States and the Soviet Union.[1]

Arms control interactions are long term issues since nations are reluctant to relinquish strategic arms considered necessary for national security. This reluctance to limit arms is illustrated by the fact that none of the documents listed in table 1 are disarmament treaties but

TABLE 1

ARMS CONTROL AGREEMENTS

	*M/B	Signed	Effective
Antarctic	M	12-01-59	06-23-61
Hot Line Agreement	B	06-20-63	06-20-63
Limited Test Ban	M	08-05-63	10-10-63
Outer Space	M	01-27-67	10-10-67
Prohibit Nuclear Weapons in South America	M	02-14-67	04-22-68
Nuclear Nonproliferation	M	07-01-68	03-05-70
Seabed Arms Control	M	02-11-71	05-18-72
Improved Hotline	B	09-30-71	09-30-71
Nuclear Accidents	B	09-30-71	09-30-71
Biological Weapons Convention	M	04-10-72	03-26-75
ABM	B	05-26-72	10-03-72
Interim Agreement on Offensive Strategic Arms	B	05-26-72	10-03-72
Standing Consultative Commission	B	12-21-72	12-21-72
Basic Principles of Negotiations on Further Limitation of Strategic Offensive Arms	B	06-21-73	06-21-73
Threshold Test Ban Treaty with Protocol	B	07-03-74	. . .
Protocol to the ABM	B	07-03-74	. . .
Limitation of Underground Explosions for Peaceful Purposes	B	05-28-76	. . .
Environmental Modification Convention	M	05-18-77	10-05-78
SALT II	B	06-18-79	. . .

SOURCE: ACDA Publication 102, May 1979.

*M = Multilateral
B = Bilateral (U.S. - U.S.S.R.)

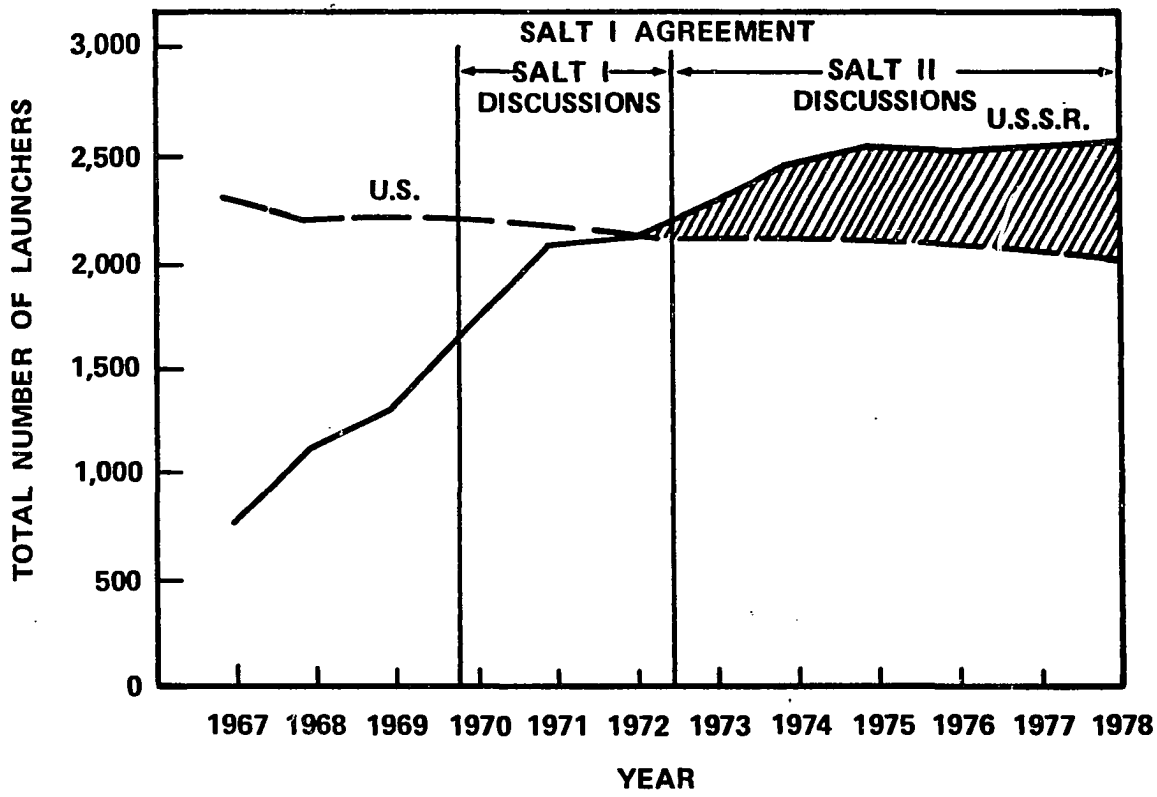
NOTE: See appendix I for summary of major provisions.

address only a specific area of arms control. The strategic arms treaties signed to date have only limited specific weapons systems while other categories of strategic weapons have continued to increase.[2]

The arms control treaties negotiated to date have been only partially successful. While all-out war has been avoided, the reduction of expenditures of human or economic resources has not occurred. The Strategic Arms Limitation Treaty (SALT I), completed in May 1972, was essentially intended to be a holding action to constrain the buildup of Soviet offensive systems.[3] The aftermath of SALT I saw an increase in the buildup or modernization of offensive missile systems. The SALT II discussions were directed toward the reduction of these offensive weapons to the point that both participants would possess equal aggregate numbers of weapons.

The Soviet Union has continued to increase the numbers of strategic nuclear launch vehicles while the U.S. has remained at a constant or slightly declining level. See figure 1. The greater numbers of nuclear launch vehicles possessed by the Soviet Union indicate that they now have the capability to launch a first strike against the continental United States (Lehman, 1978: 3). These increased quantities, along with the technological improvements in the Soviet strategic weapons systems, have made the land-based component of the U.S. defensive system highly vulnerable to incoming attack. These two Soviet factors, numbers

FIGURE 1
U.S. AND SOVIET INTERCONTINENTAL STRATEGIC
NUCLEAR LAUNCH VEHICLES



SOURCE: MICHAEL B. DONLEY, ED., SALT HANDBOOK (WASHINGTON, D.C.: HERITAGE FOUNDATION, 1979), P. 42.

and accuracy, have directed the current U.S. arms control debate to the question about deployment of an additional intercontinental ballistic missile (ICBM) to maintain the Triad defensive concept.

The Triad System

The U.S. national defense system is comprised of a triad that is composed of long-range bombers, intercontinental ballistic missiles (ICBM's), and submarine-launched ballistic missiles (SLBM's). Independently of the other two, each component of the triad is intended to have the capability to cause an unacceptable level of damage to an adversary.

There are no iron-clad laws that state that a strategic force posture must be comprised of three components nor that one of these components consists of an ICBM deployment (Gray, 1979: 69). There is merit in diversity, and the existence of an ICBM force complicates the tasks of an adversarys planning to attack the United States. Redundancy is related to diversity. Diversity is a qualitative hedge against failure of any one of the three forces. The redundancy factor gives the capability of multiple target coverage so that in the event a set of weapons fails, there will be surviving weapons capable of accomplishing the deterrent mission (Nitze, 1979: 31).

The current strategic triad components are unique in terms of military offensive capabilities and various attack vulnerabilities. Secretary of Defense Brown, in testimony

before the Senate Appropriations Committee, May 6, 1980, stated that this lack of common vulnerability complicates the incoming attack planning if the attempt is to destroy all retaliation capabilities. Additionally, a technological advancement that might reduce or neutralize one leg of the triad would leave the remaining forces available for defense.

The existence of the triad offers two additional advantages: (1) shoring up a weak member in a triad is not quite so urgent an undertaking as would be the case in a dyad; (2) the windows of vulnerability encountered by these individual components occur at different times. Exploitation of a single leg of the triad by an attacker then becomes more difficult (Ulsamer, 1980: 17).

The ICBM force provides the following attributes to the triad (Donley, 1979: 60):

- Different preattack survival mode from that which aircraft or SLBM's has and a different penetration to target mode from that which aircraft has.
- Independence from strategic or tactical warning for pre-launch survival.
- Exceptionally reliable command, control, and communications.
- Rapid response capability, prompt retargeting ability, short flight time to target, hard target capability, and high alert rate (reliability).
- Low domestic profile but large international perception.
- High confidence in nuclear weapon safety and security.

- Relatively low operating costs and personal requirements.

Threat ICBM Strategic Force

In the mid 1980s, the Soviet Union will have the capability to target two ICBM warheads (see table 2) against each Minutemen silo and still have 4,000 warheads to use on other targets.[4] The warheads targeted against Minuteman are predicted to have sufficient accuracy to destroy them (Brown, 1980). Figure 2 illustrates the improvement in accuracies of weapons possessed by the United States and the Soviet Union.[5] Incumbent Secretary of Defense Weinberger supported the increasing Soviet accuracy capability when he stated that the casualty rate to Minuteman could approximate 90 to 95 percent loss in a Soviet first strike (Aviation Week & Space Technology, May 11, 1980: 26).

The United States' estimates of Soviet accuracies are to some extent technological extrapolations. These accuracy factors are questionable since observed firings have beeen from test facilities, not operational silos and not over operational trajectories (Gray, 1978A: 53). The assumption must be made that Soviet modernization programs will continue to improve missile accuracies.

Strategic arms limitation agreements have not reduced this threat. The United States is in a critical period in strategic force acquisition to mitigate this area of concern. The key will be to select the weapon system that

TABLE 2

POTENTIAL SOVIET STRATEGIC THREAT IN 1985

	With SALT	Without SALT
Soviet strategic missiles and bombers	2,250[1]	3,000[2]
Soviet MIRVed strategic missiles	1,200[1]	1,800[2]
Soviet MIRVed land-based strategic missiles	820[1]	1,300[3]
Soviet silo-killer warheads	6,000[3]	10,000-15,000[3]
Soviet total strategic warheads and bombs	9,500[3]	13,000-18,000[3]

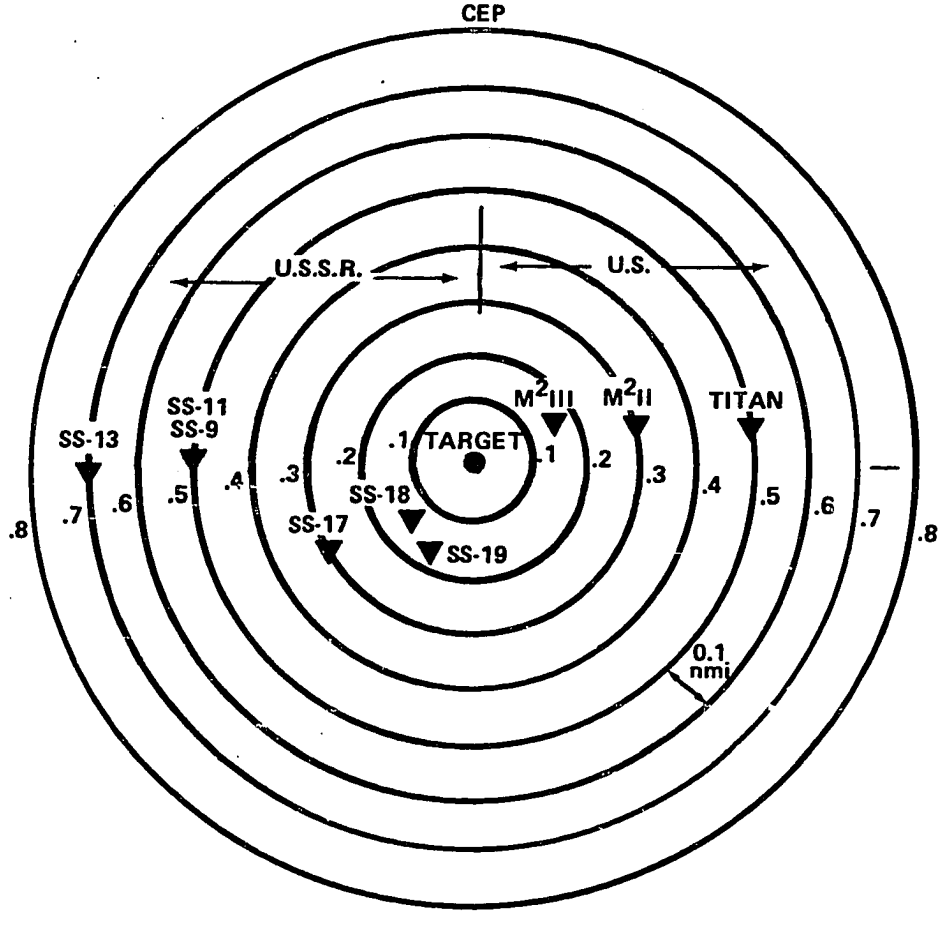
SOURCE: Hearings Before the U.S. Senate Committee on Foreign Relations, September 18, 1979.

[1]From treaty.

[2]Secretary Brown's statement to the Senate Armed Services Committee, July 23, 1979.

[3]Determined in Senate Armed Services Committee hearing, July 23, 1979, during questioning of Secretary Brown and Under Secretary Perry.

FIGURE 2
CIRCULAR ERROR PROBABLE



M^2 = MINUTEMAN

SOURCE: MICHAEL B. DONLEY, ED., SALT HANDBOOK (WASHINGTON, D.C.: HERITAGE FOUNDATION 1979), P. 140.

will best maintain national security in the required time frame.

Because the ICBM strategic force is the first leg of the triad to become vulnerable, this research is directed to this component. Special emphasis is placed on the mobile (MX) land-based system as an alternative to alleviate the threat to the Minuteman. In addition, consideration is given to the deployment of a short range antiballistic missile system intended to be a low-altitude, short-range air defense system.

Research Purposes

The focus of this dissertation is twofold: (1) to evaluate selected factors affecting progress in arms control, and (2) to analyze the proposed deployment of the mobile land-based ICBM concept in conjunction with a low altitude air defense system (LoAD). In this regard, three majors factors will be emphasized: theories of deterrence, the concept of "technology creep," and models of the decision making and negotiation processes.[6]

The primary purpose of this dissertation is an analysis of the problems and issues associated with the deployment of a proposed weapon system in conjunction with strategic arms negotiations. The intended users are the arms controllers involved in weapon system selections, decisions and negotiations, and other individuals interested in the implications of the weapon system selection process.

Much of the available literature is written about each of these proposed factors separately, but consideration of their impacts collectively on the selection of weapons systems for negotiation and the negotiation process is lacking. The contribution of each of these factors to the weapon system selection process will be considered in the context of applied policy analysis. Previous research on this question has not combined these three theoretical perspectives to identify potential problem areas in the weapon system selection.

Integration of these factors may have a synergistic effect on the arms control process. Arms control interactions are impacted by perceptions, attitudes, and intentions of the decision makers who must have a familiarity of the capabilities of the weapons systems to be negotiated and of the technological improvements to be considered for these systems. Arms control negotiations are intended to persuade the other side to give up systems that may weaken or limit response capability. To accomplish this successfully, the front-line negotiator must be cognizant of the weapons systems' capabilities, their perceived impact and the potential impact of technological changes in these systems.

Research Methodology

Applied Policy Analysis

1. Definition

This dissertation uses an applied policy analysis format. This technique is applicable to the process of

selecting weapons for deployment and negotiation consideration because the approach provides the arms control policy makers with a range of alternatives predicated on their ability to cope with an issue, to solve a problem, or to satisfy multiple criteria for inclusion in negotiations.

Policy analysis can be defined in a variety of ways. Since there is such a range in terms of definition of the technique, one might conclude that there is no one best method for approaching the analysis.[7] Ballard (1979) confirms that there is no single approach to policy analysis that is always applicable, neither is one approach inherently better than another and the approach can only be explained in the context of well-defined problems. Wildavsky, further supporting this notion, believes that the content is defined by the boundaries that appear appropriate at the time. The approach to be selected should be influenced by the substantive problem area and the needs of the policy makers.

2. Approach to Analysis

The approach to the applied analysis contained in this dissertation will be based on a general model derived by White et al. (1978). This model has been used for a variety of research purposes and it is flexible enough to be applied to this research. Of course, several modifications will be required in order to fit the particular substantive aspects of arms control. Table 3 contains the breakdown and task description of the approach to policy analysis selected for this research.

TABLE 3

POLICY ANALYSIS STAGES

Stage	Task Description
1. Problem Definition	Identification and definition of the problem of arms control: 1. When did the issue arise? 2. Is problem long- or short-term? 3. Who are the participants? 4. Why were strategic arms limitations initiated? 5. What are the results to date?
2. Policy Context Description	What are the key political and technological variables affecting the strategic arms limitation process? 1. What are the institutional arrangements? 2. How are institutions utilized in the policy process? 3. What are the factors that impact progress in arms control?
3. Identification of Alternatives	What weapons systems are available? What are their technical characteristics?
4. Evaluation and Comparison of Alternatives	Weigh each against the evaluation criteria. What are the costs, risks, or benefits of these systems of concepts? What are the barriers or constraints to deployment?
5. Recommendations	Weapons systems for deployment.

3. Problem Definition

The statement of the problem addressed by this dissertation, briefly reiterated, is that there are several factors influencing weapons systems that must be considered together in order to understand adequately the strategic arms control and selection process. Unclear problem definitions can lead the analysis in the wrong direction. The problem definition becomes the framework for the analysis, and the analyst must have not only a clear understanding of the problem but must define the scope and boundaries of the problem to be considered (Ballard, 1979).

Policy Context Description

In an applied-policy analysis there are two phases of research, technical and policy, which are considered to be integral parts of the analysis (White et al., 1978). The technical portion in the issue of arms control is necessary to delineate the alternative weapons systems available and the characteristics of each. The policy analysis contribution is the interpretation of the results of the technical evaluation in terms of the political system within which it will hopefully be utilized.

The policy context stage of the analysis describes the existing systems for addressing the issues. The problems are related in this step to the political context in which they will be resolved (Ballard, 1979). The policy context includes the institutional arrangement for addressing the

arms control problems, the implications of strategic arms limitation for other policy areas (linkages), the factors that impact the process, and the progress in arms control.

Identification of Alternatives

In an applied policy analysis one cannot consider all alternatives, but this step provides for filtering through those that can be recognized. This filtering process allows the elimination of those alternatives that are perceived to be high risk, costly, or impossible to implement (Ballard, 1979). Quade (1979: 117) writes that the generation of alternatives is a creative act and, except for narrow problems that permit closed mathematical formulation, one cannot reasonably consider all possibilities. The alternatives considered in this dissertation are selected according to three factors: existence of the weapon or concept, technical capabilities of the weapon system, and political feasibility of a proposed weapon concept.

Evaluation Criteria

The criteria for evaluation of the alternatives are contained in table 4 and measures for these criteria are contained in table 5. The criteria are not listed in order of importance because of the tendency for each decision-maker to place more emphasis on one than another. Applied policy analysis lends itself to the utilization of both quantitative and qualitative measurement. The alternatives

TABLE 4

EVALUATION CRITERIA

Criterion		
Deterrent Potential or Stability	-Does it contribute to international stability? -Does it have long- or short-term utility?	See table 5 Qualitative -Basing -Reliability -Accuracy -Utility
Environmental Impacts	Disturbance or destruction to areas of potential deployment - Does it modify or change physical areas or regions if deployed? - Are there sufficient environmental resources available for system support?	Qualitative -Environmental disturbances ●Modifications required ●Long or short term ●Repairability Quantitative -Resources required ●Water ●Electricity
Vulnerability	Capability to survive an incoming attack -Do system characteristics promote survivability?	Quantitative -Survivability ●High ●Low
Verifiability	Compliance and adherence to negotiated treaties -Does weapon system lend itself to verification by national technical means?	Qualitative -Degree of verification certainty ●High ●Low
Social and Political Impacts	Adoptability and acceptability -Is weapon system selection politically expedient? -Does deployment create social concerns?	Qualitative -Public opinion -Congressional opinion

SOURCE: Adapted from White et al., 1978.

TABLE 5

EVALUATION CRITERIA MEASURES

Criterion	Measure
Deterrent Potential/ Stability	A. Basing 1. Level one 2. Level two 3. Level three B. Reliability 1. Level one 2. Level two C. Accuracy 1. Inaccurate (CEP) 2. Accurate (CEP) 3. Highly accurate (CEP) D. Utility 1. Level one 2. Level two
Environmental Impacts	A. Additional acres/miles land required 1. Low (<5000 acres) 2. High (>5000 acres) B. Restorability in years 1. Less than life of system 2. Greater than life of system C. Resources required 1. Water required/available (gallons or acre feet) 2. Electricity required/ available (mega-watts)
Vulnerability	A. Low (<50 percent) B. High (>50 percent)
Verifiability	A. Low (<90 percent) B. High (>90 percent)
Social-Political Aspects	A. Public opinion B. Congressional opinion

evaluated may lend themselves to one method of measurement more readily than another. Ballard (1979) writes:

> The various uses of quantitiative and qualitative analysis in these two stages of policy analysis seem relatively straight-forward. However, their application and integration in the third step, analysis of alternatives, is more problematical. This is largely because of the values traditionally assumed by the words "qualitative" and "quantitative." As discussed in the introduction, if quantitative is defined as explanative or predictive knowledge, then, of course, quantitative analysis is the preferable approach to evaluate policy alternatives. However, if these terms are used to denote different ways or organizing and assessing knowledge, then neither is inherently superior. The value of this approach for applied policy is that it allows for a broader assessment of policy alternatives, since both qualitative and quantitative knowledge are viewed as legitimate and necessary.

The deterrent criteria are measured qualitatively according to a weapon system's impact on the stability of the international environment.[8] The deterrent measure is dependent upon the way the weapon system is perceived by an adversary and is directly related to basing modes, reliability, and weapon system accuracy.

These attributes of deterrence that contribute to stability are measured on an objectively derived scale. The measures for the basing factor are based on three levels of perception. At level three stability is uncertain because expert opinion is divided about system contribution to deterrence. Level two contributes to stable conditions because the basing concept is fixed and has been deployed ten years or longer. At level one the weapon system causes

almost no concern in the international environment because it is a fixed base system that has been deployed for fifteen years or longer. These measures are based on perceptions of the weapons systems and expert opinion.

System reliability is a technically derived factor that is based on whether or not the weapon will perform when it is needed. Two degrees of reliability are considered with one being an uncertain degree of confidence because of limited logistics support and the absence of a periodic flight test program. The higher, more reliable category two exists when the system has periodic flight testing and is logistically supported. The measures are based on data derived from unclassified military or associated publications and personal interviews with knowledgeable technical personnel.

The accuracy factor is related to the certainty that a weapon system has the technological capability to hit specific targets. The measure is the Circular Error Probable (CEP) data contained in unclassified publications. Three factors are considered. First, a system is considered to be inaccurate when compared to 1980 technological capabilities. Second, a system is considered to be accurate when compared to 1980 technological capabilities. Third, a system is considered to have latest state-of-the-art capabilities.

The length of time the system can be expected to be a credible system is labeled utility. Short term utility (level one) exists when less than twenty years remain in the

life cycle of the weapon and long term (level two) is considered to be greater than twenty years.

The data for measurement of the environment's criterion will be obtained from the U.S. Air Force Environmental Impact Studies and from other credible sources such as university research centers. These systems require acquisition of both publicly and privately owned land. When the measure of the additional land requirements are greater than 5,000 acres, the impact will be considered high, but when the measure is fewer then 5,000, the impact will be considered low. These deployments damage the natural surroundings during site construction and system deployment. The measure for this damage will be in terms of years required to restore the surroundings. Restorability with the life cycle of the system is considered the most desirable.

Land-based deployments place an additional burden on natural resources such as water and electricity. The measure of this criterion is the projected requirements versus projected amounts available in terms of gallons or acre feet and mega-watts respectively.

The vulnerability criterion is qualitative and is evaluated to the degree (high or low) of vulnerability applicable to a particular system. Similar to the deterrent criterion, vulnerability measures are impacted by the basing mode and operational characteristics. The measure for this criterion is in terms of low and high vulnerability. Low

vulnerability has less than a 50 percent kill factor during an attack. A high degree of vulnerability has a kill factor of greater than 50 percent during an attack. The data for this criterion are based on published statements of Secretaries of Defense Brown and Weinberger concerning vulnerability of the fixed-based ICBMs.

Verification is probably one of the most difficult issues to negotiate in arms control. To have a reliable and accurate verification process, an onsite open inspection by each side would be required. Since this onsite inspection is unacceptable, verification is left to national technical means (NTM) which, roughly translated, means finding out the best way one can.[9] Some of the verification techniques include satellite and aerial photography, radar surveillance, and intelligence gathering networks. The measure of this criterion is in terms of the degree of certainty with which verification can be accomplished by NTM. A high degree of certainty would be with 90 percent confidence that verification can be made by aerial photography capabilities. A low degree of certainty would be less than a 90 percent degree of confidence that verification can be accomplished by this means. The measures are based on technical or military publications and unclassified personal interviews with knowledgeable personnel.

Social and political criteria are indicators of weapon system acceptability to the general public. Political

impacts should not be a consideration in weapon system selection, but they are. Congressman Aspin (1980), chairman of the Oversight Subcommittee of the House Permanent Select Committee on Intelligence, contends that political influence enters the picture in the intelligence estimating stage where the requirements for new weapons systems may originate. He says that the estimates are often highly responsive to political needs of the moment.

The political impacts of the proposed MX deployment are twofold: (1) the impact of the decision to manufacture and deploy the missile and (2) the highly controversial subject of how and where the missle should be deployed. The measure for these impacts is the result of public opinion polls conducted by recognized polling organizations. High levels of opposition occur when large scale missile deployments are not considered to be politically expedient because of lack of public acceptance of the requirement. Low levels of opposition occur from small interest groups on almost every large scale deployment.

Segments of the land-based ICBM component of the triad are presently deployed and operational. The proposed MX deployment is in the committee review cycle in Congress and congressional voting positions have not been established. Congressional positions on the MX are extracted from available committee reports, congressional research reports, and personal interviews with personnal who are involved in this aspect of the proposed deployment.

Evaluation/Comparison/
Implementability of
Alternatives

As in the basic model utilized for constructing this analysis, the fourth stage evaluates the proposed alternatives against the established criteria. Feasibility of the implementation of each alternative is included in this stage of the analysis.

Despite the policy maker's needs for a firm "bottom line" recommendation, there are no single measures or evaluation criteria that can adequately summarize the risks and benefits of alternative policies and implementation strategies. The results of this analysis do not eliminate the uncertainties the policymakers face in making deployment decisions. This analysis will be useful to the extent that it will be completed systematically using specified criteria and qualitative or quantitative measures (White et al., 1978: 36-38).

Recommendations

Stages one through four of this analysis define the problem and establish a framework for considering the alternative solutions within the institutional setting for making weapons system selection decisions. The researcher has made a concerted effort to eliminate and minimize personal bias or preferences in the information supplied for the decision-makers. Stage five contains the researcher's conclusions and interpretations of the information contained in the analysis.

Summary

This chapter addresses the issue of strategic arms limitation from the aspect that the previously negotiated treaties only limited the systems or categories of weapons that were specifically negotiated. Continued development in non-negotiated areas is not illegal but it increases the requirement for development of systems to counter the resultant threats. Because of past emphasis on defensive systems, the land-based offensive component of the U.S. defensive triad will be vulnerable to attack during the mid-1980 period. The existing and proposed land-based ICBM defense system will be examined as a means of countering the increased threat utilizing applied policy analysis. The next chapter introduces the institutional arrangements for making arms control decisions. The chapter includes a discussion of the national security council (NSC), the way in which the president utilizes the NSC, and the decision models that may be utilized in weapons system decisions.

Chapter I Endnotes

[1]The U.S. and the U.S.S.R. are the primary participants because of their superpower status and because of their negotiations of missile systems that have intercontinental capability (the range to reach the interior of the other's country). Although the Western European allies have been kept apprised of these negotiations, they have not had an active role since these systems will not be based on their soil.

[2]There are several variations of the reasoning behind the two superpowers' decision to enter the SALT process. One is that the overall political and military power of both nations had evolved into such positions that some type of accommodation of both political interest and strategic necessity must be reached. The SALT process could have come into being to instrument this readjustment and to ease the transition from a period of cold war to one of detente (Wolfe, 1979: 3). An important factor that led to these arms limitations talks was the launching of the first orbital satellite by the Soviet Union. Technological advanced in satellite technology, i.e., photographic capability for verification purposes, the capability to place an object in a fixed orbit, and later the ability to maneuver the satellite once it was in orbit, gave the Russians a basis to negotiate. An additional factor that contributed to the start of the arms control negotiations was that the Soviet Union had recovered from the effects of World War II and felt that recognition before the world as a power equivalent to the United States was required for their foreign policy purposes.

[3]Interview with Tom Graham, Chief Council,ACDA, October 1980. Also see Gerard Smith, Doubletalk (New York: Doubleday & Company, Inc., 1980, pp. 446-452.

[4]The effectiveness of allocating multiple warheads to a single target simultaneously is controversial because of the fratricide problem. Fratricide is the term used to indicate the destruction of one incoming warhead by the detonation of another warhead. For lethality purposes simultaneous detonation must occur and timing is the problem.

[5]The accuracies are shown in terms of circular error of probability (CEP). The CEP is the radius of a circle within which half of any number of missiles is expected to fall. Lethality is a function of the warhead yield and CEP. It is directly proportional to the square of the CEP. For example, multiplying yield by a factor of eight only increases lethality by a factor of four, but reducing CEP by a factor of eight will increase lethality by a factor of sixty-four. A one megaton warhead delivered with a CEP of one nautical

mile has the same lethality as a one kiloton warhead delivered with a CEP of 0.1 nautical mile (Conflict Studies, April 1980, no. 117, p. 14).

[6]"Technology creep" is a term coined by Deborah Shapley, Science magazine, that refers to the process of small improvements in guidance and control systems or component microminiaturization of components that when brought together may form a breakthrough in technology or weapons systems.

[7]Policy analysis by definition is an elusive term. Wildavsky (1979: 14) states that it is a descriptive, prescriptive, selective, objective, argumentative, and retrospective subfield whose content is not defined by disciplinary boundaries but by whatever appears appropriate at the time. E. S. Quade (1979: 4) defines policy analysis as any type of analysis that generates and presents information in such a way as to improve the basis for decisionmakers to exercise best judgment. Ballard (1979) adds that applied policy analysis asks the question, "What do I need to know in order to do domething?" MacRae and Wilde (1979: 5) define the term as the use of reason and evidence to choose the best policy among a number of alternatives.

[8]Ballard (1979) points out that applied policy analysis is intended to improve the information base rather than to specify a decision. Treating the criteria in an equal manner provides the user experience. Quade (1979) supports this notion further by indicating that a numerical scale to measure a criterion such as deterrence, which exists only in the mind, could not be applied even if it existed.

[9]National technical means, as defined by article XV of the SALT II Treaty, is any method available consistent with recognized principles of international law.

CHAPTER II

INSTITUTIONAL ARRANGEMENTS

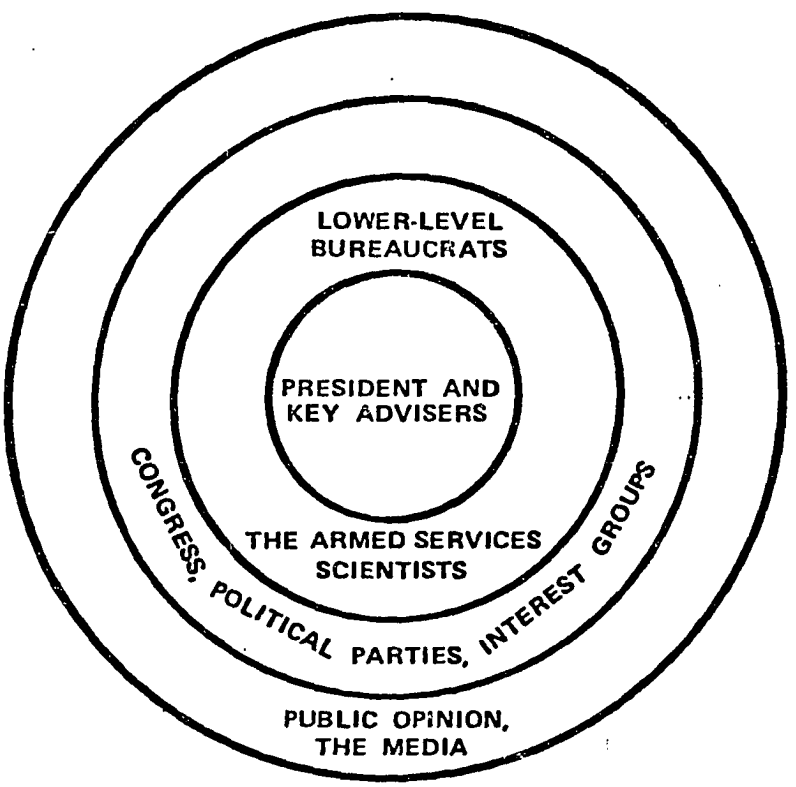
Introduction

This chapter considers the institutional arrangements for addressing arms control issues and provides part of the policy context description, stage two of the analysis. Strategic weapons selection decisions are made by the president with advice from the National Security Council (NSC) and from advisors who may occupy various positions in what can be referred to as circles of power (figure 3). This chapter discusses the National Security Council, the circles of power that may influence the arms control process, and the decision-making models utilized in strategic arms control decisions.

Central Role of the President

The president has the central role in the formulation, direction, and execution of the national security policy. This role is derived from the constitutional grant of executive power as chief of state and the designation of commander in chief of the Armed Forces. The presidency, in

FIGURE 3
THE CONCENTRIC CIRCLES OF POWER
IN FOREIGN POLICY DECISION-MAKING



SOURCE: SPANIER & USLANER, HOW AMERICAN FOREIGN POLICY IS MADE (NEW YORK: HOLT, RINEHART & WINSTON/PRAEGER, 1978) P. 50.

the face of increasing complexity of national defense programs and issues, is predominant in national security affairs. The chief executive's authority in the national security field is subject to the limitations that Congress can impose on defense budgets and on the size and composition of the Armed Forces. The president's authority is further restrained by treaty-making powers of the Senate (Falk and Bauer, 1972: 7-10).

National Security Council

The National Security Act of 1947 created a council to assist the president in integrating and implementing national security policy. The council was chartered to examine American national security goals in relation to national power, to study policies on areas of common interest to those departments and agencies concerned with national security, and to suggest guidelines and courses of action to the president.

Membership on the council consists of the president; the secretaries of state, defense, and the services; and other officials whom the president might designate with the advice and consent of the Senate. To insure the availability of an adequate intelligence base, the 1947 act also created a Central Intelligence Agency (CIA). The CIA operates under NSC direction, coordinates all intelligence activities concerned with national security, correlates and evaluates

national security intelligence, and advises and reports to the council on all matters within this field (Falk, 1967: 33-35; Newhouse, 1973: 143-45).

The NSC lacks executive authority or any power other than offering advice as an extension to the presidency. The president makes the final choice and the council members as department heads are in position to see that these decisions are executed. The personality and individual desires of each president determines the role and the scope of the NSC (Nitze, 1978: 195; Falk, 1967: 34).

NSC Department Roles

1. Department of State

The secretary of state is the president's principal advisor in foreign policy and head of the Department of State. The terms "foreign policy" and "National Security Policy" have become identical in many ways, giving added weight to the role of the secretary as principal advisor to the president (Falk, 1967: 59; Nash, 1973: 66).

In recent years the influence and responsibility of the secretary and the department have diminished. Some observers have blamed this decline on inadequate organization and poor management practices in the department. Others attribute the role to the attitude of the president who may or may not be willing to use the secretary and the department (Falk and Bauer, 1972: 59-61).

The role and responsibility of the secretary himself is dependent on his relationship with the president. This relationship varies by administration and Falk writes (1967: 76) that there is nothing in the constitution or law that requires the president to do otherwise.

The State Department also has a role in the formulation of national policy on arms control and disarmament through the Arms Control and Disarmament Agency (ACDA). ACDA was established in 1961 to manage and coordinate research and development for arms control and disarmament policy formulation, to prepare and manage U.S. participation in international negotiations in arms control, and disarmament activities (U.S. ACDA Publication 102). The director of the ACDA is the principal advisor to the president and the secretary of state on arms control and disarmament.

2. Department of Defense

The secretary of defense is the principal advisor to the president on defense matters and is the civilian head of the department. The secretary is a statutory member of the NSC and his operational military authority flows through the joint chiefs of staff to the commanders of the unified and specified military commands. The secretary of defense is responsible for relating defense policy of national objectives, for determining military requirements to achieve these objectives, and for procuring and maintaining this strength.

Civilian control requires a clear distinction between political and military responsibilities and the institutional subordination of the latter to the former (Falk and Bauer, 1972: 97). Recommendation of the civilian secretary involves military matters for which military advice is required. The joint chiefs of staff and the individual secretaries of the services suffer a dual-hat dilemma of being the secretary of defense's representatives in their departments as well as heads of their departments (Winnacker, 1978: 36).

In addition to being the manager of the national military establishment, the secretary of defense has an equally important role as presidential advisor on defense matters. The performance of the advisor role, unlike that of defense manager, varies not according to the man himself, but his relationship to the style and personality of the president (Falk and Bauer, 1972: 106).

3. Central Intelligence Agency

The Central Intelligence Agency (CIA) was created by the National Security Act of 1947 for the purpose of providing information, advice, and independent assessment in matters related to national security; and, it reports directly to the National Security Council. The CIA is only one of several intelligence agencies that provide information on the armed services and other agencies of the federal government. Allen Dulles (Nash, 1973: 131-32) justified the

existence of an independent agency through its ability to collect, analyze, and present facts without being biased by individuals who have an ax to grind. Barnet (1973: 123) supports this need for independent assessment by stating that there is so much rivalry within the Pentagon that occasionally "treaties" are drawn up between the services reflecting compromise agreements on intelligence estimates on the numbers of Soviet weapon systems in existence.

Nixon (1980: 260-64) considers the "Black Arts" of intelligence data gathering as being essential to success or failure of the president in his role as a world leader. He further states that there were failures in the CIA estimates (during previous presidential administrations) in the numbers of missiles the Soviet Union would deploy. These estimates were part of the data used to formulate the numbers of weapons that would be required by the United States.

Congressman Les Alpin indicates that the mixed record was caused in part by inherent uncertainties in forecasting. Table 6 is a summary of the accuracy of the U.S. intelligence forecast. Most of the mistakes are attributed to errors in judgment rather than collection procedures. The principal sources of misjudgment are Soviet strategic priorities, political and bureaucratic pressures, and inabilities to learn from past mistakes. The implication of basing negotiations on these forecasts is that their acceptance can cause errors in both "too much and too little" in providing

TABLE 6
U.S. INTELLIGENCE: FORECASTS VS REALITY

EVENT	PREDICTION MADE	PREDICTED YEAR	ACTUAL	OVER: + UNDER: − RIGHT: 0
DATE OF SOVIET A-BOMB	1945 (GROVES)	1965	1949	−
	1945 (SCIENTISTS)	1949		0
	1949 (INTELLIGENCE)	1952		−
DATE OF SOVIET H-BOMB	1950	1954	1953	0
NUMBER OF SOVIET LONG-RANGE BOMBERS BY 1960 ("BOMBER GAP")	1955 (AIR FORCE)	600–700	190	+
	1955 (NIE)	500		+
NUMBER OF SOVIET ICBMS BY 1961 ("MISSILE GAP")	1957 (AIR FORCE)	1,000	10	+
	1957 (CIA)	500		+
NUMBER OF SOVIET ABMS	EARLY 1960S	10,000	64	+
DATE OF SOVIET MIRV DEPLOYMENT	1965	1970	1975	+
	1968	1978		−
	1969	1971 OR 1974		+
NUMBER OF SOVIET ICBMS*				
BY 1967	1964	325–525	570	−
	1965	330–395		−
BY 1970	1965	410–700	1,299	−
	1966	505–795		−
BY 1971	1967	805–1,080	1,513	−
BY 1972	1968	1,020–1,251	1,527	−
	1968	1,158–1,276		−
ICBM ACCURACY AND YIELD				
FOR SS–9 ACCURACY	1969	.25 CEP	.5 CEP	+
FOR NEW MISSILE ACCURACY	1973	.5 CEP	.25 CEP	−
FOR SS–18/–19 YIELD	1978	1.5 MEGATONS	600 KILOTONS	+

*SOURCE: ALBERT WOHLSTETTER, LEGENDS OF THE STRATEGIC ARMS RACE, USSI REPORT 75-1 (WASHINGTON, D.C.: UNITED STATES STRATEGIC INSTITUTE, 1975), P. 24.

the required missile systems. Interestingly, a forecast has not been close to actuality since the H-bomb prediction in 1950.

4. Role of Congress

Congress monitors, reviews, counsels, criticizes, approves or disapproves, and provides or withholds the means for executive action. The congressional contribution to national security affairs is necessarily fragmented, focusing primarily on military and foreign policy.

The national security area is broad and the House and Senate have individual and joint committees that consider the subject. The most obvious are the House and Senate Armed Services committees. Additional important committees are the House Appropriation Committee where the money bills originate, the Senate Foreign Relations Committee, and the House Foreign Affairs Committee.

The chairman and ranking members of these committees are among the most powerful individuals in Congress. Their support or opposition frequently means the difference between adoption or defeat of administration proposals (Falk and Bauer, 1972: 78-81).

The federal constitution does not address national security as a separate matter. It designated power to both Congress and the president to provide for the common defense. The president has clearer authority over foreign and military policy than he has over internal matters. He shares his

authority over the military with Congress, which makes rules, appropriates money, and declares war; but, it is he who exercises initiative, authority, and leadership in military and foreign affairs. The next paragraphs describe the sources of advice available to the president in his decision process.

Presidential Advisors

Ultimate responsibility for decision making in arms control remains with the president. Decisions are made with the assistance of advisors who may be selected from anywhere in the circles of power illustrated in figure 3.

The president and his key advisors are at the nucleus of the circles of power. The kind of advice a president receives is subject to a degree of predictability because of backgrounds and values of the inner circle advisors. The advisors become screeners of information passed on to the president. They tend to pass only information that is favorable to them and data to support alternatives that are supportive of their own interests (Downs, 1967: 77-78; Goodpaster, 1978: 111).

The second ring of influence is occupied by the armed services' chiefs of staff, scientific advisors, and lower-level bureaucrats. The function of the second group is to provide ideas and alternatives for the inner circle's consideration. In the realm of arms control policy, the joint chiefs of staff provide recommendations for the deployment of strategic weapons systems and those systems to be

included in negotiations. The position of the joint chiefs may be considered as advisory to the secretary of defense; however, they usually occupy a position in the inner circle (Spanier and Uslaner, 1978: 61-62; Allison, 1969: 709). Spanier and Uslaner further believe that the position of the joint chiefs is enhanced by the identification of the military with national pride or patriotism. The role of the scientist is that of advisor. His importance depends primarily on how much the president values scientific advice.[1]

The third circle consists of Congress, political parties, and interest groups. The degree of their involvement frequently depends on the seriousness of the situation. For example, foreign crises usually do not lend themselves to consultation with large groups like the Congress or political parties. In crisis situations the leadership is typically informed and consulted.

Decisions made by the inner circle regarding arms control treaties are subject to review and ratification by Congress. This review cycle does not produce an automatic concurrence with decisions made by the president. Thirty percent of the 1,600 treaties submitted for ratification have not been ratified (Nacht, 78/79: 127-29).

Interest group participation in the strategic arms policy has been high and, to some degree, effective. The proposed Safeguard ABM deployment is similar to the proposed MX deployment in that it was to be dispersed over a broad

area of the United States. Public interest groups in the metropolitan areas of Chicago and Boston were successful in having proposed deployment sites removed from their areas.

The fourth or outer ring of power in the foreign policy decision-making process is comprised of public opinion and the communications media. Countless volumes have been written relative to the impacts of this circle of power on the decision-making processes. Public opinion tends to be supportive of presidential decisions on foreign policy, particularly in crisis situations (Spanier and Uslaner, 1978: 91). The media, particularly television through significant improvements in video communication, make almost instantaneous information available on any issue.

The greatest impact of the video coverage is caused by the importance placed on the commentators by the public (Nixon, 1980: 242). Nixon refers to these commentators as "Trendies" who are ready with an opinion at the drop of a microphone--their minds are impervious to argument and their arguments impervious to facts.

The president may draw advisors from any place in the bureaucracy to participate in the decision process when a particular expertise or background may be required. Dr. Rufus Hall has stated, "Where you stand in a particular decision making circumstance has no relation to where you sit in the Government bureaucracy" (Hall, 1980). This is true in crisis situations; however, Allison (1969: 711) writes that in

decisions where long term issues and large numbers of people are involved where one stands does depend on where he sits. The following section discusses decision models that have been used in arms control issues.

Decision Models

Two conceptual models, rational actor and bureaucratic, have been selected as being demonstrative of the framework used in foreign policy decisions. Although the rational actor model has normally been applied only to crisis situations and the bureaucratic to continuing issues, both have been applied to arms control and weapon system decision processes.

1. Rational Actor

The rational actor model assumes that the decision-maker will select the objectives and values that a given policy is supposed to achieve and maximize, consider the various alternatives to achieve the purpose, and calculate the consequences and choose the course most likely to attain the objectives originally selected (Allison, 1969: 694). In this model the government is viewed as a unitary actor, with the participants in the decision-making arena limited in numbers.

A characteristic of this decision-making process is that the decision making takes place at the top of the hierarchy in conjunction with the presidential advisors

(Spanier, 1978: 464-70). The participants selected for a particular situation are not restricted to those within the inner circle of advisors. Individuals may be selected for their expertise in a given area, and the fact that they do participate may not be indicative of their positions held within the government. The remaining characteristics of the model are the central role of the president, who interprets the events and evaluates the stakes in the crisis; the subordination of bureaucratic interests to the needs for decisions to safeguard the national interest; and lastly, the lack of congressional involvement.

These crisis issues are time sensitive and simply do not lend themselves to large numbers of people or the inclusion of Congress, who must be advised after the fact. There is less search for information and alternatives, with more bias toward preconceptions, especially where these decisions reflect the core values of the participants (Wilenski, 1967: 75). These small "tiger teams" are subjected to the same pressures that have been observed in groups of ordinary people (Janis, 1972: 8). Janis thinks that these groups have a tendency to form a unity or cohesiveness that may alter the effectiveness of decisions. He describes the "group think" phenomenon (p. 9) as:

> . . . a quick and easy way to refer to a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of actions.

2. Bureaucratic Model

The bureaucratic model sees the government as composed of many actors encompassing all four circles of power. The conceptual model focuses on internal politics of government where emphasis is placed on outcome of overlapping bargaining games (Allison, 1969: 690). The leader who sits at the top of the organization is a player in the central competitive game. In contrast with the rational actor model there is no single unitary player, but there are many participants with no consistent set of objectives. Each proceeds according to a conception of national, organizational, and personal goals. Emphasis is placed on the pluralistic nature of decision making and is characterized by the long term issues involved. The hallmark of the model is compromise.

The bureaucratic model applies best to planning program policies such as preparation for arms control negotiations or foreign aid. Spanier (1978: 470-78) characterized this model as follows:

-Group interest in foreign policy issues may be high in a specialized area such as trade tariffs but low in issues such as arms control.

-Conflict will occur because of the multiple actors involved.

-The policy process becomes a problem of building consensus of reconciling conflict.

-Policy moves ahead, as a result of bargaining and compromise, and in increments.

-The incremental chracteristics make the process time consuming.

-Competition among advocates may result in exaggerated sales pitches.

-Foreign policy made through this model is usually public in nature.

Summary

This chapter has addressed the institutional arrangements that exist for strategic arms decisions. The president is depicted as residing at the nucleus of a decision structure with the assistance of a national security council, mandated by law, to provide advice or assistance as required. Dependent upon the situation, the president may draw a particular individual for a specific situation or rely on the bureaucratic process for advice on long term issues. The next chapter will address the utilization of the NSC in the strategic arms limitation process and the conceptual decision models applied by the presidents who have been involved in strategic arms limitations.

Chapter II Endnote

[1]Skolnikoff (1967: 224-27) writes that there were three formal organizations primarily concerned with foreign policy in the Kennedy Administration, one of which was the Office of Science and Technology. Johnson retained the office but did not rely on it as much. Lambright (1978: 22-24) attributes the decline in the use of science advisors in the Nixon era to the shift in public opinion. In 1973, Nixon demolished the entire White House science policy advisory apparatus. Carter, having an engineering degree and proclaiming himself to be a nuclear physicist, reestablished the science advisors in his circles of power. Reagan's transition team recommended the disbanding of the group, but Reagan retained a science advisor (Washington Post, February 8, 1981).

CHAPTER III

NATIONAL SECURITY STRUCTURE UTILIZATION AND DECISION MODELS APPLIED

Introduction

The previous chapter addressed the institutional arrangements that exist for providing presidential assistance in arms control and national security matters. Two conceptual decision models were described that have been applied in strategic weapons system selection for arms control negotiations. This chapter discusses the utilization of the National Security Council (NSC) system by the four presidential administrations that have been involved or are presently engaged in strategic arms issues. A discussion of the application of the conceptual decision models is included in this portion of the policy analysis that is part of the stage two institutional arrangements.

NSC Utilization and Decision Model Applied

The purpose of the National Security Council is to coordinate policy initiatives of governmental agencies and to provide the president with advice on national security

issues. Presidents typically regard the NSC in their own way and the NSC role in the formulation of security policy changes to meet the criteria imposed by the chief executive. The presidential administrations that have been involved in the strategic arms control process have utilized the NSC system differently and have provided different applications of the decision models.

Johnson Administration

Johnson inherited the NSC established by the Kennedy administration, but with time diminished its role in security functions (Falk and Bauer, 1972: 46-48). Johnson's meetings were more often informal sessions and deliberation was less likely to concern current problems than those of his predecessor. Johnson preferred to discuss national security issues outside the NSC framework. Falk and Bauer (1972: 49) write that the most important deliberations took place at the "Tuesday Lunch" with the secretaries of state and defense.

The arms control policy decisions reached outside the NSC were made in the context of the bureaucratic model. Arms control activities in the 1964-68 period were characterized by the numbers of agencies and people involved, the controversy and the compromise involved because of the multiple views of the inner circle participants. Johnson demanded recommendations that represented a consensus of views between the military and civilian actors (Frye, 1974:

74; also Newhouse, 1973: 108). President Johnson acknowledged this decision-making philosophy in 1968 when he said, "Sometimes I have been called a seeker of 'consensus' --more often in criticism than in praise, and I have never denied it. . . ." (Burns, 1968: 1).

Johnson's lack of interest in the NSC was probably due to the prominence of the Vietnam issue (Nitze, 1978: 108; Taylor, 1978: 20). The lack of usage of the NSC did not alleviate the demand for consensus. This lack did mean that agreement on the weapon systems selected for negotiation would have to be reached individually with the Pentagon, ACDA, State Department, and the CIA (Newhouse, 1973: 108).

Progress in reaching the required consensus was hampered by lack of program definition or direction, and further constrained by the fact that the agencies did not know how to go about preparing for arms control negotiations. While the competition for power and position was going on in the inner circle, a lower level bureaucrat, Morton Halperin, had a memorandum signed by Secretary of Defense Clifford that named himself (Halperin) as the person in charge of the Pentagon's strategic arms limitation proceedings (Newhouse, 1973: 111-13).

The military establishment and Congress on one side were pushing for the initiation of an aggressive ABM deployment, while the advisors in the inner circle and the Science Advisory Committee were arguing the futility and

danger of matching the Soviet program (Willrich and Rhinelander, 1974: 72-73). Both sides were presenting stability of international security from their respective views.

After the Soviet Union announcement to deploy an antiballistic missile system (ABM), the Halperin group presented its package of proposals to Johnson. The package consisted of limiting ABM, freezing long-range missiles, banning mobile missiles, excluding qualitative limitations, and including freedom to mix aggregates of different weapons (Newhouse, 1973: 127). Agreement was reached (June 1968) with the Soviet Union and details were finalized to start the exchange of opinions in October 1968. Johnson writes that the Soviet invasion of Czechoslovakia halted the process; however, the Soviets kept pushing to start the talks (1971: 487-91). After the presidential election in November 1968, Johnson made the determination that the talks should not be held up by Soviet behavior elsewhere but should commence immediately for the benefit of the world. President-elect Nixon was given a personal invitation to participate or send a personal representative for purposes of continuity. Johnson states that Nixon named retired diplomat Robert D. Murphy to attend on his behalf (Johnson, 1971: 490). The Soviets declined the invitation to hold preliminary discussions. Johnson's opinion on this declination was: "I had a strong feeling that the Soviets had been persuaded to deal with the incoming administration."

The Nixon administration did not intend to pick up the strategic arms limitation gauntlet without having had the opportunity to evaluate its own options. Nixon (1978: 245) did not want to be boxed in by any decisions made by a previous administration. Johnson's intuition that Nixon had discouraged a Soviet meeting on SALT prior to Inauguration Day 1969 was correct. Kissinger wrote (1978: 50) that Nixon advisor Robert Ellsworth was instructed to inform the Soviet charge d'affaires that the president-elect would not be pleased with such a meeting with the lame duck administration.

Nixon Administration

During the 1968 presidential campaign Nixon had blamed lack of progress and the state of the American international security interests on the lack of Johnson's use of the NSC system. Nixon's stated goal was to restore the NSC to its proper role in national security planning (Nixon, 1968: 10). Nixon further stated, in a 1968 speech, that he desired an open government and advocated the appointment of cabinet members who could do their jobs. He would then disperse power among these able people in order that they might function effectively (Barber, 1977: 420).

Nixon started devising a structure and process aimed at meeting this goal soon after the November 1968 elections. The structure would be designed to suit his own style of leadership. The NSC was to be the principal forum

for the consideration of policy issues. It would meet regularly and on January 20, 1969 the supporting structures of the NSC were already at work on comprehensive studies covering the principal national security issues that would confront the president (Falk and Bauer, 1972: 52-53).

Nixon appointed Henry Kissinger as an assistant to the president for national security affairs.[1] The purpose of this appointment was to place emphasis on planning, discussion of alternatives and their implications, systematic treatment of issues at the highest levels, and effective implementation of decisions.

President Nixon considered the appointment of the national security advisor equally as important as the secretary of state because he intended to direct all foreign policy from the White House. The selection of Henry Kissinger as his national security advisor would produce the most powerful member of the inner circle of power this country has ever known.

In terms of the decision-making models, the rational actor model most nearly describes the decision-making process utilized by Nixon. Nixon made the most of his decisions, particularly those concerning arms control issues with small numbers of people involved. Nixon (1978: 337-38) believes that the key to a successful presidency is the decision-making process wherein he is protected from intrusion by his staff, with options being concisely written because more

material could be absorbed by reading rather than by talking about it.

In the foreign policy arena, Nixon considered himself capable of designing and conducting his own policy (Newhouse, 1973: 143-45). Newhouse adds (p. 7) that Nixon concealed not only from the public but also from the bureaucracy since the bureaucracy was often sent off on wild goose chases to keep them out of Kissinger's hair. Nixon attributed the necessity for this small number of participants in foreign policy to governmental security leaks. The consequence of these leaks led to operating the government in more confined and secret ways (Nixon, 1978: 39). Kissinger writes (1979: 38) that Nixon skillfully manipulated his advisors while he undertook his solitary journey with a system of policy making that centralized power at the White House.

Nixon's and Kissinger's views on the necessity for secrecy and control in the strategic arms issues were compatible. They believed that successful foreign policy evolved from being formulated in secret and withheld until they were ready to unveil the results.[2] Kissinger (1978: 47) further supports this notion in that the reorganization of the National Security Council and the downgrading of the role of the secretary of state made it possible for him to use the bureaucracy for producing planning papers that would appear only hypothetical. He would take these position papers and formulate the basis for his Nixon-directed secret negotiations.

Kissinger at one time referred to the entire network of subordinate echelons including the secretaries of state and defense and joint chiefs of staff as the seventh echelon (Nitze, 1978: 109).

Where the Johnson administration had lacked a central figure to coordinate a timely pre-negotiation position for the pending arms control talks, the Nixon era was clearly dominated by Kissinger. The decision-making technique applied by Nixon and Kissinger was a hybrid approach of the rational actor model and might be considered as an acute restrictive rational actor model where the decisions were made by these two individuals. See appendix 2 for a discussion of the organization assembled for strategic arms limitation issues. The acute restrictive rational actor technique, as applied in the SALT process, consisted of a widely distributed network for the input of data from the many agencies or organizations that could provide requested input only.

Correlation of data was essentially directed by one individual who prepared a series of alternatives for the chief executive, who weighed all options and made final decisions. Kissinger writes (1978: 148) that Nixon left the selection of options to be presented for decisions to Kissinger's discretion: "I therefore scheduled NSC meetings where options were presented to a glassy-eyed, irritable President so that any directives issued would have some plausibility of authority."

The decision processes used were restrictive in that information outputs were carefully controlled. The organizational setup in the NSC was utilized only to the extent that it appeared to have legal basis and legitimate authority to act as directed. The decision-making technique was acute from the standpoint that the writer perceive the authority resided in two men. Thus the term "acute restrictive rational actor model" is applied to the 1968 to 1974 SALT process.

Output of information from the inner circle of power in the acute restrictive model was limited only to that essential to get or gain a needed concurrence at that point in time. Contacts to gain information to make a decision or to advance stalled negotiations were, on numerous occasions, made through secret communications or almost clandestine-style meetings. Requests for information from the Congress were answered with vague generalities such as "I am not as familiar with that issue as you are," or "In the best interests of negotiations' progress," or "In the best interests of national security, that data cannot be released at this time" (Platt, 1978: 45).

The initiation of the SALT I negotiations was evident in November 1968; however, the formal talks did not begin until the fall of 1969. The Nixon administration, through its intense review of all options and alternatives, the restricted authority for decisionmaking, and its desire

for secrecy, entered the process with essentially the same ongoing negotiation position as the Johnson administration had recommended (see Smith, 1980: 477-78). The SALT I negotiations were completed during Nixon's first term in office and the SALT II talks were started. See appendix 3 for a summary of the SALT I provisions.

Carter Administration

President Carter, like his predecessor, inherited one of the most complicated ongoing arms control issues in history. Negotiations had been in process since 1972, the principal positions of each of the superpowers had been established, and President Carter making wholesale changes in the process and product would not have been expedient. The operational concepts of the organization put together by former President Nixon and his secretary of state, Henry Kissinger, were unacceptable to the Carter administration. The secretary of defense and former secretary of state had been excluded to the maximum extent, and, yet, they were considered within the legal realm of the national security process. Reports given to Congress up until 1974 were vague and testimony presented to congressional committees was terse and clouded with exclusions under the concept of executive privilege. Carter, like Nixon in the previous campaign, had stated many times during the primaries that he would reinstitute open government. Congress would be brought into the foreign policy arena, information would

be supplied, and reports would be issued at regular intervals. Not only was the previous administration's management philosophy unacceptable to the new president, but also Henry Kissinger was personally unacceptable. Carter did not like his flamboyant diplomatic style (Stoesinger, 1979: 250-54).

Carter's campaign rhetoric ("I will never lie to you") and desire for openness in government brought about an increase in the size of the inner circle of advisors. He included his Secretary of State Vance, NSC Advisor Brzezinski, UN Ambassador Young, and CIA Director Turner. Carter was often charged with implementing the "Georgia Mafia" or the "Redneck Crowd" in his cabinet. Spanier and Uslaner (1978: 54-59) write that no president has relied as heavily upon advisors who had served previous administrations. The new faces introduced by Carter were primarily domestic policy advisors such as Bert Lance.

The NSC was brought back into the decision process with the president's National Security Advisor, Brzezinski, playing a coordination role. Brzezinski was not the dominant framer of arms control policy. The Director of ACDA, Paul Warnke, instigated the establishment of a committee of twelve House members and twenty-five Senators to act as congressional advisors to the SALT delegation (Wolfe, 1979: 36-39).

Carter turned the bureaucracy loose on SALT while he tended to other matters. The direction given was to use

the Vladivostok Accords as a basis for SALT II and then pursue deep reductions in SALT III (Talbot, 1979: 43). The enlargement of the inner circle numbers is indicative that the bureaucratic model was used in the decision-making process. Accordingly, Carter made changes in the strategic arms limitations organization. He disbanded the verification panel, the key deliberation body dealing with SALT within the NSC system. This panel, established by Nixon and chaired by Kissinger, was replaced by a special coordinating committee, whose function was essentially the same as the verification panel.

The organization for the remainder of the negotiation of SALT II is shown in appendix 2. The Carter administration used the bureaucracy for forming independent positions with final critique being performed by the NSC staff prior to being presented to the president (White, 1981).

President Carter sent Secretary of State Vance to Moscow in March 1977 for the purpose of reducing the numbers of offensive weapons systems that had been tentatively agreed upon at the Vladivostok meeting in 1974.[3] The Soviets had not overlooked President Carter's criticism of the Soviet philosophy on human rights in his campaign and promptly rejected the offer (Stoesinger, 1979: 253; also see Talbot, 1979: 79).

Secretary Vance's assessment of the first meeting with the Soviets convinced him that the open forum for arms

control issues was not the way to go. He advised Carter that the secret diplomacy or back channel approach was the only way to get the Soviets to "open up" and discuss the issues freely (Talbot, 1979: 79). According to Talbot, the open policy was reversed within one week of Vance's recommendations.

SALT II was finalized during Carter's term in office after almost seven years of negotiation. See appendix 4 for a summary of the SALT II provisions. The treaty as signed by President Carter and Brezhnev in 1979 had not been ratified by the U.S. Senate. Three issues--perceived inequality in numbers of missiles, backfire, and verifiability--contributed to the treaty's not being ratified.

The SALT II treaty contained a provision that would allow the U.S. to deploy a mobile ICBM after 1982. The purpose of the new system was to augment the capabilities and survivability of the presently deployed ICBM force. On June 7, 1979, President Carter announced his decision to proceed with full-scale engineering development of the MX to include 200 missiles, 200 race tracks, and 4,600 shelters. These numbers were chosen to make use of the SALT II cap on numbers of Soviet reentry vehicles (RVs) (Medalia, 81: 8; also see Congressional Digest, November 1980: 261).

Consequently, should the Soviets deploy more RVs than SALT II permits, something will have to be done to improve MX survivability. One solution to the enhanced

survivability of MX is to deploy a low altitude air defense system (LoADs) in conjunction with the mobile ICBMs.

In September 1979 President Carter announced his decision to base the MX in a road-mobile mode to be located in the western deserts. The recommendation did not reach the congressional approval stage because of a series of House and Senate amendments to the defense authorization and appropriations bill (Congressional Digest, November 1980: 261).

President Carter stated his intent during his inaugural address in 1977 to work toward the elimination of nuclear weapons. During his tenure, he cancelled the B-1 bomber program and the enhanced radiation warhead (Brauch, 1979: 133; Lehman, 1978: 1-14). He left his successor with a controversial strategic arms limitation treaty that lacks Senate approval and an ICBM developmental program that is equally as controversial as the treaty.

Reagan Administration

Reagan's presidential campaign was in part based on the premise that America's national security can best be guaranteed by a strong defense capability second to none. The intent is to have a credible capability to deter Soviet attack by having forces that will survive a first strike and ultimately retaliate against military targets. He also supported the earliest possible deployment of the MX missile in a prudent survivable configuration (Christian Science Monitor, October 28, 1980).

President Reagan has taken a tough line approach toward the Soviet Union. He did not oppose a SALT II treaty but insists that it would be better if negotiated from a position of strength (Strout, 1980: 4). Senate Foreign Relations Committee Chairman Percy visited the Soviet Union on November 26, 1980 to explain the new administration's position on SALT II. The Soviet response to this meeting was that constructive steps would be met with positive Soviet response (Willis, November 28, 1980).

The Reagan administration is described as having the most new faces since the Kennedy-Johnson era. For example, of the thirteen cabinet members selected by Reagan, seven had been in private industry most of their working lives; however, out of the 213 additional appointments at the decision-making level, 121 have had previous experience with the federal govenrment (Havemann, 1980: 275).

The notable exceptions to the cabinet appointments are Alexander Haig as Secretary of State and Caspar Weinberger as Secretary of Defense. Haig was chief of staff to Presidents Nixon and Ford, while Weinberger held two cabinet-level posts in the Nixon and Ford years (Havemann, 1980: 675).

President Reagan's utilization of the NSC and his decision processes relative to the MX program are not known.[4] The assumption is made that the NSC structure is being utilized to some degree, but anticipation is that the role will

be one with low profile. Allen, Reagan's National Security Advisor, confirmed this on the day of his appointment when he stated, "You're seeing a disappearing act right now" (Gordon, 1981: 688; also see Christian Science Monitor, July 10, 1981: 4). Reagan had stated in his presidential campaign that he would end the conflict between the NSC and state department by downgrading the council's role. The NSC, dependent upon the president, has functioned as a competing policy-making organization. The role as a filter of memoranda from the state department and other agencies has enabled national security advisors to gain the upper hand in policy issues. Secretary Haig, who served as an assistant to Kissinger, is well aware of this fact.

President Reagan has made two additional changes that reflect the administrtion's thinking on arms control organization and policy. A major reorganization has been planned for the Arms Control Disarmament Agency which is in charge of arms limitation negotiation and has appointed a new chief arms control negotiator.

The new ACDA organization under Walter Rostow will include an upgraded verification and intelligence office. The primary function will be holding the Soviets to more stringent verification standards. Lt. Gen. Edward Rowney (R), a hard-liner from the negotiate-from-strength/hang-tough with-the-Soviets school, has been appointed as the new chief negotiator (Schear, 1981: 26).

Advice is being sought from many sources about the MX basing decision. Secretary of State Haig is an advocate of the ground-based concept and Secretary of Defense Weinberger proposed the air launched system (Harsch, 1981: 1). The Office of Technology Assessment has completed a study (copy not available) concerning the deployment. The Townes Committee, established by President Reagan, is currently reassessing the basing and deployment modes. A central point of contact for questions related to MX, called MX Associates, has been established in Washington, D.C. The office is staffed by the many prime contractors involved in the program.

President Reagan did not accept the basing-mode decision recommended by the Carter administration. Gray (1980: 4) writes that MX/MPS program inherited by President Reagan suffers politically from the perception that it is a Carter program. Carter delayed the deployment by three years and it may be unfortunate if the Reagan decision is delayed for this reason.

Summary

This chapter has addressed the utilization of the National Security Council on its advisory role to the president and the conceptual decision model applied by each in strategic arms control issues. Since strategic arms limitation is a continuing and integral part of foreign policy, it is best analyzed from a chronological review by presidential administration.

Initiation of the strategic arms limitation was delayed during the Johnson administration in part because the process was new and no one knew how to approach it. Further delays were caused by lack of positive direction by the president relative to what systems should be included. Johnson's requirement for consensus, rather than options from which he could select, allowed the derivation of which systems should be negotiated to flounder until 1968.

While the inner circle of advisors were pondering the problem, a group consisting of members from the second and third circles prepared and obtained concurrences for the contents of the initial negotiating package. This action must be considered an accomplishment because the group had no conference rooms of its own in which to hold meetings and to obtain a needed concurrence; yet, the group wrote as many as seventeen position papers in a twenty-four hour period (Newhouse, 1973: 127).

President Nixon further delayed the initiation of SALT I while his advisors reviewed the options and alternatives available. The ingoing negotiation position for SALT I was almost identical to that recommended by Johnson regardless of the difference in styles of decision making. The SALT I document was finalized during Nixon's first term and preparation for the follow-on talks were started.

The Carter administration inherited an on-going negotiation and very early found out that the invocation of

secrecy in negotiation, as practiced by Nixon, with the Soviets was necessary. The SALT II document was finalized during the Carter administration after a seven year negotiation. The total numbers contained in the treaty were not substantially different from the figures derived at the 1974 Vladivostok Accords.

The Reagan administration inherited the non-ratified strategic arms limitation treaty and an on-going ICBM developmental program that is almost as controversial as the treaty. Reagan did not accept the recommendation of the Carter administration on his deployment, just as Nixon would not initiate negotiation after SALT I based on Johnson's recommendation.

The next chapter completes the policy context stage of this analysis with a discussion of the factors considered in this research to impact progress in arms control. The factors to be discussed are technological advancement, deterrent concepts, and the negotiation process.

Chapter III Endnotes

[1]Nixon's recollection of the selection and notification of Kissinger that he had been selected as national security advisor (NSA) does not correspond with Kissinger's recollection. Nixon recalls that Kissinger was selected in an "impulsive way," and said, "Being a Rockefeller associate, he had been critical of me but I chalked that up to politics. After the second meeting with Kissinger, I asked if he would accept the position of NSA and he replied that he would be honored" (Nixon, 1978). Kissinger describes the selection process quite differently. In the initial discussion, Nixon stated that he nad no confidence in the state department, that he would run foreign policy from the White House, and that he thought the Johnson administration's decision-making procedures gave the president no real options from which to choose. During the second meeting, Kissinger writes that Nixon offered the job on the basis of a strong security advisor, "But I asked for a week to consult with friends." Two days after the offer was made, Kissinger accepted. After the press conference announced a program substantially different from what we had discussed" (1979: 10-16). Nixon had said that he was going to appoint a strong secretary of state and the NSA would not come between him and that office.

[2]Gerald Smith (Doubletalk) quotes an article written by Kissinger in 1968 that depicts Kissinger's decision-making processes as coinciding with Nixon's. The article concludes that changing courses of action within the bureaucracy is difficult and time consuming; consequently, important decisions should be made by extra-bureaucratic means. Some key decisions are kept to small circles due to bureaucratic morale problems and leaks to the media; thus, secrecy is essential to decisionmaking. Kissinger (1979: 546) writes that he was determined to keep a tight rein on Smith. Also see Clark, 1979: 173; and Szulc, 1978: 465).

[3]This decision to propose the reduced numbers originated with Secretary of Defense Brown in a March 12, 1977 meeting of The Special Coordinating Committeee. Carter listened to Brown's proposal and responded, "Good, let's do that." The proposal was written, but at the same time, a fall-back position was prepared and attached to the proposal (Talbot, 1979: 60-63). Carter stated in a press conference, ". . . We're not abandoning the Vladivostok Agreement . . . if we're disappointed . . . then we will modify our stance (Talbot, 1979: 67).

[4]In a telephone conversation with a Pentagon official that is associated with the MX, the statement was made that as of 1 August 1981 Reagan had not met with the

NSC. His decision process for MX was not available. A written request was directed to one of the president's assistants for political affairs that questioned these procedures. A response was received that stated that the inquiry would be directed to the proper office with the hope that it would be answered.

CHAPTER IV

FACTORS THAT IMPACT PROGRESS IN ARMS CONTROL

Introduction

Chapters two and three address the institutional arrangements existing for strategic weapons decisionmaking and suggest ways these institutions are utilized. This chapter completes the policy context description, stage two of the analysis, with a discussion of the impact or influence of technology creep, deterrent concepts, and the negotiation process on progress in arms control.

The appearance of a technical innovation that adds to a weapon system's capability or alters its performance in some way impacts the environment of deterrence. One technological innovation that evolved is the Multiple Independently Targeted Reentry Vehicle (MIRV). The MIRV concept is the result of a series of technological improvements in guidance and control systems, metallurgical improvements, and electronic components that were individually insignificant. Collectively, they made it technologically possible to place

a number of nuclear warheads on a long-range missle rather than a single warhead.

The deterrent strategy of a nation's strategic defense policy may have an influence on the selection of weapon systems to be deployed: for example, the essence of the U.S. doctrine is to retain a second strike or retaliatory capability. When this capability becomes vulnerable, new weapons are required to enhance the existing capability or protect it. Any new system must be a credible deterrent in order to increase stability.

Once decisions are reached, they are implemented by arms control negotiators through the negotiation process. The outcome of these negotiations is influenced by the relationship of the president and his advisors to the negotiating team. This relationship and the negotiation process will be discussed from the aspect of past experience in arms control in order to provide a better understanding of the problems that may be anticipated with the deployment of a new ICBM system.

Technology Creep

Technological advances in the states-of-the-art do not occur in clearly defined steps, but in increments, frequently at low cost, and with very little attention. Because of the separation of scientific and political communities, these low profile developments are overlooked by arms control negotiations that focus on the big, sophisticated,

total weapon systems (Shapely, 1978: 1102-05). There are some weapons technologies with obviously destabilizing effects which will nevertheless appear desirable or even necessary for national security reasons (Reppy, 1979: 91). The destabilizing aspect is caused by the appearance of a technology in which the adversary may not have capability to defend nor offensive techniques against which to counter. The Multiple Independently-Targetable Reentry Vehicle (MIRV) is a good example of technological innovation and the cause of one of the most destabilizing, controversial arms control issues in the last decade.

MIRV

MIRV is a small missile system with no guidance and control system of its own and a warhead. The MIRV is placed around the periphery of a carrier vehicle called a bus. The bus contains the primary guidance and control system, and at predetermined times ejects a MIRV, which in turn boosts itself towards an independent target. The number of MIRVs per bus may vary from ten on ICBMs to fourteen on SLBMs, per the pending SALT II Treaty.

The development was encouraged by the arms control bureaucracy, because of its capability to accomplish a wide variety of missions. MIRV development caused little attention due to the lack of technical problems encountered and because of its relatively low budget profile. DOD estimated cost over a period of five to eight years was $24.2 billion

(Greenwood, 1975: xi-i). The political uncertainties of continued funding and final approval for deployment that accompany developmental programs--i.e., Sentinel or Safeguard--were virtually absent. There were no drawn-out budget and funding hearings, and the opponents of the development were few. MIRV's full strategic and political impact did not appear until it was virtually ready to be deployed in August 1968 (Roberts, 1974: 22). Final approval to deploy MIRV would have been as easy to obtain a decade later because of its low development profile.

Deborah Shapley (1978: 279) has attributed technological advancement of weapons systems to five factors: electronics, guidance and control, the geophysical capability of determining location and position, sensors, and advances in materials. All of these factors were utilized in the MIRV system. The technology to stop and restart the bus's main engine (electronics) in order to place each reentry vehicle on a different trajectory was required; and, vernier rockets to precisely adjust the bus trajectory just prior to expulsion of MIRV were developed--i.e., guidance and control. Equally as important was the evolution of the physical profile of MIRV itself which required construction materials that permitted rapid reentry into the atmosphere and sufficient strength to permit overall reduction in missile size.

Development

Developmental programs, particularly those that evolve as quietly as MIRV, seldom attrack much public attention. Public indifference and scholarly neglect have been compounded by the tendency of DOD officials either to obscure the real forces propelling these technological issues to national controversy or to treat them as purely specialized problems requiring only technical solutions (Yanarella, 1977: 2).

Secretary of Defense McNamara was opposed (1964-65) to increasing the number of larger ICBMs. He utilized the MIRV technology as a means of increasing the number of deliverable warheads as a rationale for retaining the same number of large delivery systems. The bureaucratic maneuvering to use a technological advance as a means of pacifying the political opposition to increased numbers of large delivery systems was later to have a profound effect on the SALT process (Wolfe, 1979: 6-9). The effect was that it prompted the Soviets to preempt MIRV from SALT I until their developmental program was completed.

One of the functions of ACDA is management and coordination of research and development for arms control and policy formulation. The ACDA apparently first learned of MIRV in 1964, but it shared McNamara's views on the technology and reached a conclusion in 1968-1969 that MIRV had implications for arms control (Clarke, 1979: 98-99). At

this point, the ACDA felt that MIRV was gaining momentum and the process could not be reversed. ACDA, in a House of Representatives subcommittee hearing, defended their lack of involvement in weapons system development during the 1961-1969 period with such factors as: lack of sufficient personnel, omission from the mainstream flow of classified information, and utilization for projects other than those they were chartered to do (Subcommittee Hearings, 1974). During the 1969 to 1974 period, the close policy control by President Nixon and Henry Kissinger deterred the ACDA from advocating their views on arms control issues before Congress. By this time Nixon's appointing of Kissinger as Secretary of State placed ACDA under the direction of the state department.

The government response to MIRV technology was an excellent example of the ways new weapons systems evolve through technology creep. The program received funding with minimal congressional questioning. The institution chartered to screen weapons-system development had been overextended and diverted to other issues; and, once MIRV appeared, there was indecision on the best methods to handle it. In hindsight, Dr. Kissinger stated, "I would say in retrospect that I wish I had thought through the implications of a MIRVed world more thoughtfully in 1969 and 1970 than I did" (Clarke, 1979: 98). He meant that if he had been more aware of the capability the technology possessed, he would have directed more attention to its development.

David Edwards (1969: 28-29), University of Texas political scientist, has criticized the scientific and technical communities for responding to such technological needs as the MIRV. He said:

> Developments have created both the threat and possibility of total destruction . . . the scientific and technical knowledge underlying military capabilities have always been permanent in that it could not be eliminated unless frontal lobotomies were performed on all knowledgeable men.

The criticism is the immediacy with which the scientific-technical community concentrated on offensive systems, such as MIRV, and concentrated very little of defensive systems. The defensive effort has been directed to hardening silos to protect missiles and fallout shelters to protect command and control centers. This defensive effort, in turn, decreases weapon system vulnerability which, in turn, assures that retaliatory action can be initiated. Professor Edwards concludes that the technology of construction and defense can never hope to deal effectively with the technology of destruction. Technological advances which create a first-strike capability are destabilizing; thus, controlling a technology is important to international stability (Brooks, 1979: 76-80). The progress of science and technology is so swift that if control measures are not taken, the development of new weapons systems may not only open the door to the development of less costly weapons, but could also aid the circumvention of existing restrictions and limitations (Milstein, 1981: 55).

Colonel Donald J. Stukel believes that technological developments may produce such stabilizing capabilities as renewed safeguards against accidental launch, increased reliability of warning systems, and improved intelligence collection and verification (1978: 22-23). Further results may be destabilizing effects such as systems whose numbers and characteristics may not be verifiable, and capabilities that enhance surveillance systems. Colonel Stukel concludes that to control testing is the most adequate way to control technology.

An in-depth discussion of the direction and control of science and technology is beyond the scope of this research. Stukel's suggestion that controlling testing is the most adequate method in controlling technology may not be valid since computer simulation techniques involving components and subassemblies are not observable. Myrdal's suggestion that resources for development should be turned off and the personnel should be diverted to other problems is not possible (1978: 10-13). Profit motive in the military-industrial complex precludes that solution. Panofsky suggests that technological and military factors alone have not caused the buildup of arms (1981: 48). He attributes the escalation to political factors and the inability to deal with problems politically.

The fact that effective measures have not emerged to control offensive weapon proliferation only increases the

importance of understanding the impact of technology creep in the arms control process. One must recognize that technological advancement can impact progress by making the verification process more difficult and by contributing to disruption in the international environment.

Concept of Deterrence

The concept of deterrence is subjective since no certainty exists that permits specific definition. Deterrence may be active when it involves the manipulation of someone's behavior by threatening to do him harm. It may be reactive when it involves the threat to use force as a way of preventing someone else's first use of force (Morgan, 1977: 9). The term "deterrence" is normally applied to conflict prevention between nation states and will be used as such in this research.

Deterrence is not necessarily restricted to military force. It may be considered as the negative aspect of political power. The explicit threat of an economic sanction or a reward of economic aid may be used to manipulate behavior. The definition to be utilized in this paper is as follows (Art and Waltz, 1977: 20):

> In a simple two-party situation, state A's deterrent force accomplishes it purpose by frightening state B out of making the military strike that it would have made had the deterrent threat been ineffective.

As noted by Patrick Morgan, this definition indicates that it is a matter between two states in which areas the threat of force is to prevent military action.

The DOD perception of deterrence, as described by Secretary Brown, is a product of several conditions. There must be a communication to the opposition about the price it will have to pay for attempting an objective that is unacceptable to the United States. The state must possess military capability to exact the payment either by denying the objective or by making it too costly. The U.S. defensive systems must not be eliminated in the process and the message must have credibility. Both the U.S. and the adversary must believe in a real probability that the promised action will be executed (Brown, 1979: 61). Secretary Brown's definition adds the ideas that the threat presented can only be carried out at a high cost to the adversary, the defensive capability exists that will survive the initial attack, and the power is present to respond to the threat.

U.S.-Soviet Strategy

The United States' strategy has been to favor a concept of mutual deterrence. This strategy involves the maintenance of a capability to inflict massive retaliatory punishment upon the society of an adversary and to concede that the other side has the capability to do the same (Wolfe, 1979: 108-10). The underlying concept of mutual deterrence is called the Mutually Assured Destruction Theory.

The Soviet strategy has been directed to the notion that the better prepared their forces are to fight and win a nuclear war, the better their society is prepared to

survive its effects; and, the more clearly the adversary understands, the more effectively he will be deterred. This approach is labeled "deterrence through denial" (Wolfe, 1979: 108-10). Talbot writes that the Soviets reinforced their notion that a nuclear war is winnable with the deployment of the SS-9 with its 25 megaton warhead (1979: 26; also see Nitze, 1979: xii). It also served to delineate the point that they are more interested in a war-winning strategy than in deterrence.

The SALT process emphasis on offensive systems indicates the importance of second-strike capability. Paramount to this retaliatory capability is survivability of the heavy intercontinental ballistic missiles. John Spanier (1978: 187) says that invulnerable strategic forces contribute to the stability of mutual deterrence. K. J. Holsti (1977: 329-35) indicates acceptance of this notion, but adds that for stability purposes it must be a mutual second-strike capability.

Credibility

Credibility is an indispensable tenet of any nation's foreign policy, particularly if that nation aspires to function effectively as a world power (Collins, 1978: 8-9). Communications is an essential part of the credibility contribution to the theory of deterrence. Communication of military credibility is carried out by visible display in public festivities such as the Paris Air Show, Armed Forces

Day in the U.S., and the annual May Day Parade in Moscow (Holsti, 1977: 315-18).

To be credible and efficient, a deterrent capability cannot be kept a secret (Dougherty and Pfaltzgraff, 1971: 258-60). There is a very fine line between the amount of information to be communicated to the adversary and which aspects of information are to be held back. Too much information about a weapon system might arouse the recipient to the point that he might launch an attack because of this new system.

Credibility depends upon the challenger's beliefs and perceptions. A crucial problem is communicating intent (Holsti, 1977: 315-18). The process of visibly impressing the adversary of existing capabilities through military parades is a much easier matter than communicating intent. At the state level this communication may be made through treaties (a form of declaratory policy) or through general declaratory policies such as the offer of assistance to any state desiring to avoid takeover by another state. The challenger will construct the image of credibility of the state's intent from the entire range of information available to him (Snyder, 1961: 240-41).

In a symposium conducted at the National War College in 1975, the notion was presented that deterrent threats need not be in kind to be effective, but they do need to be close enough to scale to be credible. For example, one could not

credibly respond to a threatened guerilla attack with a threat of nuclear retaliation. In the contemporary strategic lexicon, nuclear deterrence credibility is only applicable when national survival is threatened.

Stability

An effective deterrent must be sufficiently credible to prevent an adversary from launching an attack; and yet, it must present an adequate measure of stability that will reduce the incentive to launch a preemptive strike out of fear (Holsti, 1977: 319). The U.S. pursues strategic stability through the SALT process, in which the aim is essential equivalence. Under the assumption that essential equivalence is a prerequisite to stability, there is a conflict of goals between the U.S. and the Soviet Union in arms control. The U.S. arms controllers find their Soviet counterparts reluctant to settle for essentially equal aggregates (Collins, 1978: 8). To have a perceived equivalence may be contrary to the Soviet goal of world communism in preference to capitalism.

Missile invulnerability takes away the initiative to initiate a first strike. When the advantage to initiate the first strike is taken away, the possibility of war is diminished. Invulnerable missiles thus stabilize the environment of deterrence (Spanier, 1978: 186-87).

Deterrence Theory Framework

The mutual deterrence theory espoused by Spanier (1978: 182-83) is applicable to the proposed MX deployment. This framework contains four propositions that have impacted the MX system and these propositions are discussed in the following paragraphs.

There are four propositions contained in Spanier's (1978: 182-83) mutual deterrence theory.

(1) THE BALANCE OF CAPABILITY DOES NOT NECESSARILY REQUIRE AN EQUALITY IN NUMBERS OF BOMBERS AND MISSILES.

The acceptance of this tenet of the mutual deterrence theory may be demonstrated in the whole of the SALT II treaty. While both sides agreed, as contained in the treaty in June 1979, to have a maximum number of total delivery systems (2,250) in the inventory by 1981, there are sub-limits that allow mix and match to this total. This mix and match permits both participants to stress the systems (ICBM, SLEM, or bombers) that they prefer or require for the defense of their country.

The second strike capability is inferred in this notion since both participants go to great detail to increase the invulnerability of the systems. This inference is done through missile site hardening, improvement in mobility concepts for both ICBM and SLBM, and the emphasis currently being placed on the delivery systems for the ICBM.

(2) MOST SIGNIFICANT FOR A STRATEGIC BALANCE IS THE RIGHT KIND OF WEAPONS

The selection of a weapon system for inclusion in an inventory is, in part, a function of whether it will contribute to stability or detract from it. The heavy missile systems (Minute-man II or the SS-18) are not in themselves particularly destabilizing, but when the multiple warhead (MIRV) capability is added to these systems, the picture changes drastically. The pending MARV system, that will have terminal guidance and control systems, will prove to be an even greater threat to stability. The SLBM concept has always been a contributer to stability because of the problem of detection, range of the missile, and its range of operation.

Having a wide range of capabilities from which to select is not considered to be an end in itself. The possibility always exists that the wrong choice could be made. Holsti (1977: 335) says that the value of these flexible choices ultimately is no better than the wisdom with which they are deployed.

Concurrent to proposition 1 above and with proposition 2, the SALT II weapons systems base lines as reported by the U.S. and the Soviet Union are shown on page 80. The U.S. defense strategists have maintained the concept of a balanced, diversified force in the defense triad of land, sea, and air systems. Within the framework of the second strike strategy, each leg of the triad must independently

	U.S.	Warhead Type	Soviets
Land ICBM	504	single	790
	550	MIRV	608
SLBM	496	MIRV	144
	160	MRV	806
Bombers	573		156
Totals	2283		2504

survive a first strike and retain assured destruction capability.

The Soviets rely primarily on a dyad of the large landbased weapons systems coupled with the SLBM. Historically, they have played down the role of the manned bomber; however, the Backfire bomber included in SALT II by a side letter has augmentation capabilities that make it a potential long-range bomber.

(3) ADVERSARIES INFORM EACH OTHER OF THEIR DEFENSE POSTURE BY A SUCCESSION OF SIGNALS

The communication factor reappears in the spectrum of attributes required for a deterrent to be successful. The communications must be from both directions to be effective. A one-sided communication is about as effective as a kidnapper who has no means or method of contacting anyone to demand a ransom. Spanier (1978: 192) cites an instance in the U.S.-Soviet relationship in which a non-communication took place that left the U.S. with the perception that the Soviets are intent upon obtaining a first strike capability. This non-communication occurred because the Soviets could

not present an adequate argument for deployment of the SS-9 through SS-18. These missiles were the heavies of the Soviet arsenal.

> (4) THE BALANCE OF RESOLVE MAY WELL BE MORE IMPORTANT THAN THE BALANCE OF CAPABILITY IN PRECIPITATING A CRISIS. THE NUCLEAR AGE HAS DISPLACED WAR AS THE ULTIMATE TEST OF STRENGTH IN DETERMINING THE SETTLEMENT OF SUPERPOWER CONFLICTS AND TERMS OF COEXISTENCE.

The balance of resolve notion stated by Spanier deals with the "how much is enough" question. The critical relationship is not the number required for a nuclear war, but the number needed to maintain a tolerable position in the maintenance of peaceful coexistence.

The selection of numbers and kinds is an intricate, complex procedure. Consideration is given to the demographic characteristics of an adversary as well as to a series of static indicators. These static indicators include numbers of missiles, bombers, warheads, throwweight, and megatonnage. The military inherently uses "worst case analysis" for quantitative planning purposes. Holsti's "para bellum doctrine" supports this worst case analysis (1977: 329). He states, "If you want peace, prepare for war."

Impacts of Arms Control

Holsti indicates that there are several built-in factors that will not permit arms control to make a substantial contribution to stability (1977: 351-52). He contends

that domestic political considerations about defense policies are given more consideration than the state of international politics. Defense policy is further agitated by interservice rivalries. Fear of surprise attack and technological advancement by an adversary are blockades to arms control.

John Polyani (1966: 179-80) supports the notion that arms control is not a significant contributor to deterrence. He said that mutual assurance against the dangers of cheating (verification) will be extraordinarily difficult to achieve in a world of intensive struggle and military conflict. Technological changes occur too rapidly to permit arms control measures to remain stable.

Phillip Green adds to this nonacceptance of arms control as a continuing contributor to deterrence (1966: 181). His thought is that the doctrine of arms control, of which deterrence theory is one aspect, and the traditional balance of power theory, of which deterrence theory is also an aspect, have been transformed in Western thought. This transformation has combined to form a general theory of competitive equilibrium. Competitive equilibrium conditions can exist in human affairs only for short periods of time. Green further attributes the decision-making processes of deterrence theorists themselves to creating unstable arms control notions. "They have the shortest time horizons of any group in the arms debate. . . . They will almost always opt for short-run stability, for next year's fulfillment of their major goal of keeping the peace." (1966: 170)

Negotiations

The arms control negotiation process is the attempt to implement the policies directed by the president or his selected advisors. The process is complicated by differences in language, perceptions, customs, and values of the nations involved.

Beyond these basic difficulties, the process is impacted by relationships of the negotiating team with the decision makers, communciations between each nation's leaders, and the complexity of the issues involved. Each of these is considered in the following sections.

Negotiation Problems

Adversaries find difficulty in negotiating international problems of the magnitude of strategic arms limitations because of "mirror imaging." One form of mirror image response aims to silence the implied threat that would give political advantage and leverage unless a system was deployed with either equal or greater capability (Panofsky, 1981: 49). An example of this image is the MIRV. The Soviets would not negotiate until they possessed the capability.

Imaging also occurs with the perceptions that the negotiators have of each other. The participants bring to the table a distrust, fear, and suspicion of their opponents. Each side believes it represents justice, virtue, and wisdom while the other side simply represents evil. Smith (1980: 72) recognizes the prospect of such a problem occurring and

indicates that friendliness between contracting parties is damaging to persuasion in international relations. He believes (p. 38) that the imaging did not occur and the personal relationships that developed during the sessions did not impact the outcome but lay the foundation or basis for further arms control talks.

Lt. Gen. Edward Rowney, a U.S. military representative to SALT II, agrees with Spanier's "mirror imaging" notion. Gen. Rowney indicates that the U.S. delegates misapplied the concept (Day, 1979: 52-53). They did not research Russian heritage or culture and thus inadvertently concluded that the Russians think and act in the same ways as Americans. Rowney contends that the Soviets resort to crude tricks to gain advantage, delay action as long as possible knowing that the Americans want progress, and will suggest alternatives and reverse position at any time for no apparent reason.

In U.S. Senate Hearings (August 1, 1979) Gen. Rowney states that the Soviets regarded the negotiations as a competition while the U.S. looked on them as problem-solving exercises. The Soviets, through their negotiating strategy, exploited the American's tendency toward impatience by selecting an extreme position on any subject and waiting. Rowney concludes that untrained participants should never be permitted to participate in proceedings that are as important as arms control.

International negotiations should take place with clarity, firmness, and consistency in negotiating objectives. Garthoff (1977: 10-13) indicates that these attributes are especially applicable to arms control negotiations with the Soviets. The typical American approach to negotiations is to enter the process with three positions: an extremely high starting point, an immediate fall-back position, and a bottom line. This bottom line is acceptable, but is a point which cannot be exceeded. Garthoff (1977: 23) writes that initial negotiating positions should provide sufficient bargaining room but not to the point that they are misleading. Consistency of these tactics is essential in attaining the desired negotiation goals.

Linkage

Linkage exists through the diplomatic connection of two objectives during negotiation: using leverage of one to gain another through reality of actions of major powers being related and having consequences beyond the issue or region concerned (Kissinger, 1979: 129; see U.S. Senate Hearings, 1979: 862). Kissinger concludes that to ignore the interconnection of events is paramount to the U.S. ignoring its responsibility as a world power and results in the undermining of all policy.

Kissinger (1961: 196) writes that the post-war period was characterized by whether or not the Soviets should be negotiated with, more than the issues that should be

negotiated. The intent was to connect negotiation with transformation of the Soviet government's actions to those that are more acceptable to the Western world.

Nixon (1980: 267-69; also 1978: 346) writes that linkage is a just concept and states that he and Kissinger developed it in 1969 and after two years sold the Soviet Union on the concept. According to Nixon, the notion works because the Soviets want economic cooperation but will not accept it solely on the basis of a benevolent ideal for world peace.

The effectiveness and necessity for linkage in SALT I and II is debatable. Contrary to Nixon's belief that the Soviets accepted linkage, Smith (1980: 26) writes that the Soviets never accepted the notion and reminded him of the fact several times during SALT I, referring at one point to a "no linkage" agreement. Kissinger (1979: 138-44) also refutes the effectiveness of the notion, stating that an announcement by Smith that the talks would soon begin caused the media and Congress to apply such pressures to begin that the administration's attempt to link SALT with other issues--i.e., Vietnam--had to be abandoned. Carter's attempt to link the human rights issue to arms control was a failure also (Stoesinger, 1979: 253).

The point that the Soviets did not accept the linkage notion in arms control is demonstrated by their placement and subsequent refusal to remove troops from Cuba (October 1979)

and their December 1979 invasion of Afghanistan. These events both impacted the U.S. Senate ratification hearings that were in process at the time. The notion is that the Soviets did not need to be concerned with linkage because of the numbers of nuclear weapons possessed and because the United States had recognized them as an equal power when the administration initiated strategic arms talks with them. The Soviets possessed the necessary power and command of resources to insulate themselves against adverse pressure in an international relationship (Thorndike, 1979: 87).

The extensive SALT II Senate ratification discussions were directed primarily toward two issues, numbers of weapons and verification. Panofsky writes that linking arms control negotiations to the political process--i.e., ratification--places undue political importance on the detailed numbers of military systems (1981: 50). No one can reliably predict a specific outcome of military conflict based on the precise number of weapons deployed.

The Reagan administration is approaching future arms control negotiation with the Soviets from the standpoint that the U.S. negotiates better from strength than weakness (Southerland, 1981: 1). The approach to negotiations is being linked to Soviet good behavior. Secretary Haig, in a speech to the American Bar Association, reiterated that no more is expected of the Soviet Union than any other country. Restraint in the use of force, respect for

independence of other countries, and adherence to reciprocal obligations are three expected behaviors (Christian Science Monitor, August 13, 1981: 24).

Back Channel Communication

Progress in arms negotiations is impacted by the relationship of the chief negotiator and the key decision maker. The strategic arms negotiations are not conducted in a manner like other forms of international negotiations. Smith describes the process as being very formal with fixed procedures and very little bargaining in the sense that there are no immediate offers and counter offers (1980: 54-71). The positions presented are read from carefully worded texts that have been transmitted by the decision makers. Smith (1980 interview) stated that he had absolutely no latitude in negotiations and with this direction would retain a position until otherwise directed. New positions would be received that would be acceptable to the Soviets with minimal discussion. He was later advised that these agreements were reached through back-channel means.

Back-channel communications are secret contacts or communications between individual officials that detour the regular communications channels either within or between governments. The technique was first introduced in the SALT process in 1970 and was frequently used during the January to May 1971 period by Kissinger. The back channel was used at least fourteen times during the SALT II negotiations (Wolfe,

1979: 81). According to Wolfe, these contacts by Kissinger continued through the Ford era. Carter utilized the techniques; however, he included Secretary of State and Chief of Negotiations and ACDA Director Warnke.

Arguments can be made in support of the technique in that it puts heads of state in direct contact, leaving room for more give and take in discussions. The heads of state can directly settle the issues that are beyond the authority of the individuals involved in the details.

The Reagan administration has advised the Soviets that they are not interested in the utilization of the back channel for informal talks on arms control. They will use the process only in substantive negotiations (Temko, 1981: 20).

Verification

The inability of the United States and Soviet Russia to agree on the processes of verification has been the single greatest stumbling block to proposed treaty negotiations. Neither nation has been willing to concede to on-site inspection. The "open sky" concept proposed by Eisenhower was countered by a Soviet proposal to station troops at the major highway intersections and railway terminals in each other's country.

Progress is being made in the direction of on-site inspection. The Comprehensive Test Ban Treaty may contain provisions for placing equipment on each other's soil for

monitoring purposes. The Soviets published an outer space treaty draft on August 12, 1981 that stated that "participating states will, in the event it is necessary, consult with each other, make inquiries and furnish information related to such inquiries" (Temko, August 13, 1981A). This has been interpreted as a softening in attitude toward verification; however, the Standing Consultative Commission established with SALT I currently provides this capability.

Treaty Ambiguities

Verification articles have been included in the SALT I Treaty (article XII), the Interim Agreement (article V), and SALT II (article XV). These articles are worded almost identically. Article XV of the SALT II Treaty reads as follows:

> (1) For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use National technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.
>
> (2) Each Party undertakes not to interfere with the National technical means of verification of the other Party operating in accordance with paragraph one of this article.
>
> (3) Each Party undertakes not to use deliberate concealment measures which impede verification by National technical means of compliance with the provisions of this Treaty. This obligation shall not require changes in current construction, assembly, conversion, or overhaul practices.

National technical means (NTM) are not defined in these treaties, but are those information-collection systems

utilized in the verification process. Article XV.1 of the SALT II Treaty provides for the application of NTM at the nation's disposal in a manner consistent with international law. These NTM's include photographic reconnaissance satellites and aircraft based systems such as radars and antennas for collecting telemetry data (State Department publication 12A, 1979; also see Katz, 1979: 308). The estimated 100,000 intelligence agents in the Soviet Union and 70,000 in the United States who play an important part in the process are not accounted for in this delineation of NTM (Christian Science Monitor, September 22, 1980).

The term "deliberate concealment" is ambiguous in that it could be measures that were intentional or an action that had that result even though it was intended for other purposes (Rhinelander, 1974: 140). The First Common Understanding wording in the SALT II Treaty is no better. The clarification reads in part: "In this connection, the obligation not to use deliberate concealment measures includes the obligation not to use deliberate concealment measures associated with testing. . . ." Soviets endorse a "spirit" of SALT only when it suits the occasion. The Soviets view verification on the part of the United States to be a self-perpetuating policy because of the open policy in which it functions. The Soviets can run closer to the edge of legality because secretiveness is a strategic asset to them. The United States and the Soviet Union agreed that the

proceedings of the Standing Consultative Commission (SCC) would remain secret with publication of agenda items to be made only by mutual agreement.

Reliability of Verification

The fact that both the superpowers possess highly sophisticated means of information collection is not in question. The technical capabilities and how these vast quantities of data are collated and analyzed are beyond the scope of this research, but their implications are critical to arms control treaties (Katz, 1979: 310). Each of these techniques has inherent weaknesses. Satellite technology may be blinded by laser beams, destroyed by killer satellites, or restricted by cloud coverage. Electronic surveillance can be partially overcome by utilizing on-board flight test tape recorders that are parachuted back to earth which will prevent telemetry data from being collected.

The existence of shortcomings in detection techniques and the very loosely written, ambiguously worded verification articles, plus the Soviet penchant for doing all that is not specifically prohibited, raises the questions: "Can violations be detected" and "Are the treaties verifiable?" State Department arms controllers (Special Report No. 55, 1979) write that it is important to consider the totality of the treaty, not just specific provisions. The point stressed is that the Soviets could not exploit monitoring uncertainties of individual provisions of the

treaty in such a way that it would affect the national security interests of the United States. The Soviets cannot be sure of the overall capability of the U.S. to monitor a treaty. With all of the monitoring means available, any cheating on a scale large enough to alter strategic balance could be discovered in time to make appropriate responses.

The SALT Hearings before the Committee on Armed Services of the U.S. Senate, 1979, contain a number of supporting verification arguments. Secretary of Defense Brown indicated that there are hedges against violations such as raising the alert status of existing forces, expanding deployments, or terminating the treaty. General Allen, Air Force Chief of Staff, stated that verification is possible but we must support vigorous intelligence programs. He concludes that verification can be made with high confidence but not total confidence.

General Seignious' testimony in these hearings was also positive on verification. He identified factors that contribute to verification, such as lead times to produce and field large missile systems, the U.S. capability, and logistics support required to field and deploy larger systems. His concerns are relative to the difficulty of tracking small systems that can be totally concealed in manufacture and testing, such as cruise or other totally new concepts.

One of the opponents of verification, General Rowney, contended in these hearings that the wording of the treaty will enable the Soviets to bend system counting rules to fit their own purposes and to encrypt test data. Paul Nitze's testimony related the fact that three years were required to find out about flight tests the Soviets were conducting wherein one system was utilized to obtain data for other purposes.

In consideration of the verification process and the implications of cheating, all provisions of the proposed treaty are not verifiable; however, the impact of cheating is not as severe as it appears because lead times required to develop and deploy new systems make detection more plausible.

Summary

The policy context stage of the analysis has included the national security council organization, mandated by law, that exists for providing assistance to the president in strategic arms control decisions. Chapter two also included a discussion of two conceptual decision models that have been applied in strategic arms decisions. Chapter three depicted the utilization of the NSC and the application of these conceptual models. Chapter four considered the external influence of technology creep and deterrence on the arms control process. Strategic arms negotiations were considered as implementation processes considering the

relationship of chief negotiator with the key decision makers and the problem of verification.

The remainder of this research considers the ICBM systems available that might be utilized to counter the vulnerability threat and an evaluation of these alternatives. Some conclusions may be derived from the policy context stage that will enhance the understanding of the implication of the selection process.

The decision-making processes are unstructured with no set rules that may be applied from one instance to the next. The NSC has been provided by law to assist the president in arriving at national security decisions, but there is no requirement that it be utilized. The Johnson administration held formal meetings with the NSC, but specific security subjects were discussed with the secretaries of state and defense outside the aegis of the NSC. Nixon presented a strong stand for the NSC, but allowed Kissinger to virtually control the strategic arms decision process. The NSC framework was utilized to give the appearance of participation in the process. Carter expanded the role of the NSC by limiting his security advisors' responsibility to a coordinator's function. The Reagan administration has declared the NSC role as being very low profile to reduce the tendency of the agency's becoming a power base for personal prominence.

Presidential advisors may be drawn from anywhere in the circles of power. The prominence of position in

these circles does not seem to impact the outcome of the decisions. The lack of direction or guidance by Johnson and the attempt to use the concensus approval rather than to present options or alternatives from which to select caused an unnecessary delay in the initiation of the SALT I negotiations. The official ingoing negotiation position was solved by a member from the outer circles, who seized the opportunity to push his recommendations through the bureaucracy. Nixon refused to accept the Johnson proposals and further delayed the negotiation in order to select his own negotiating positions. These turned out to be almost identical to the recommendations that had been passed on. The Reagan approach to an ICBM deployment is similar because he would not accept Carter's recommended program.

The utilization of additional time to study these issues is questionable. The similar results may be due to the origins of the sources of advice since the preparation of SALT I. Nixon would have been surprised to know the number of the principles involved during the Johnson administration that were working in SALT I (Smith, 1980: 39). Many of the Nixon people were working in the strategic arms control environment during the Carter administration (Spanier and Uslaner, 1978: 4). Reagan selected 121 decision makers out of a total of 213 appointments, who had previous government experience.

Predicated upon past performance in the strategic arms selection decision process, the decision for the MX

deployment will be an extensive process. With many of the arms control advisors and decision makers remaining in the international security environment, the precedent for the extended deliberation process has been established. The situation is not likely to improve. Individuals may change, political leadership may change, different factions may vary according to intellectual fashion; but, those groups to which the nation looks for leadership will remain very much the same throughout the next two decades (Nixon, 1980: 8).

Technology creep has the greatest potential for impacting the strategic arms limitation process. Often technological advancement in non-related developments produces minute improvements that collectively produce a new weapon system concept. These advancements occur at a more rapid pace than do political solutions to the problems they create.

The concept of deterrence does not impact the weapon system selection process. Factors or components of the deterrent umbrella--i.e., stability, credibility, and vulnerability--are impacted by a weapon system selection, but in the final analysis do not prevent a weapon system deployment. Had deterrence been a primary factor in weapon system selection, then MIRV would not have been deployed and the MARV developmental program would have been stopped.

The negotiation process is an extension of the key decision makers and progress in negotiation is impacted by that relationship. The chief negotiator must be kept apprised

of all communications concerning the in-process negotiation. Lt. Gen. Rowney's (R) appointment in August 1981 as Chief Strategic Arms Negotiator is a step in the right direction to improving the process. He, as a military advisor to SALT II, observed that the U.S. tendency to impatience during negotiation and pressure to produce are factors that must be alleviated in order to produce stronger negotiated treaties (Day, 1979: 52-53).

The next chapter addresses the ICBM systems and concepts that are available to the land-based defensive component of the triad. It includes their operational characteristics and a description of the warhead capabilities.

CHAPTER V

WEAPON SYSTEM ALTERNATIVES FOR THE STRATEGIC ICBM FORCE

Introduction

The U.S. ICBM leg of the defensive triad is being upgraded to protect its survivability during an incoming attack because of technological improvements in Soviet ICBM accuracy and the capability to place multiple renetry vehicles on one ICBM. The preceding chapters have discussed the need for retaining the triad and the strategic weapon system selection process that exists for making these selections. The environment surrounding weapon system selection was found to be an unstructured framework wherein neither the source of the advice nor the conceptual decision model utilized for making the selection impacted the outcome of the final selection.

This chapter addresses the policy alternatives stage three of the analysis. Land-based systems that comprise the existing strategic ICBM force and the proposed mobile concept as an addition to this force are discussed. A potential

ABM system that could be deployed with the land-based systems is also discussed. A concluding section describes the warhead destructive capabilities.

The missiles included are the Titan II, Minuteman, Missile Experimental (MX), and the low altitude air defense (LoAD) system. Table 7 contains a summary of these ICBM system characteristics. Figure 4 identifies the existing deployment sites. Two general areas in Nevada and Utah and Texas and New Mexico have been selected for the proposed MX deployment (see figure 5).

Fixed-Base ICBMs

Titan II

Titan II is the elder statesman of the ICBM family and it carries the largest of all the U.S. ICBM payloads. In operation since 1963, the system is deployed in three wings of eighteen missiles each at Davis-Monthan AFB, Arizona; McConnell AFB, Kansas; and Little Rock AFB, Arkansas (Collins, 1978: 89). The fifty-four Titans account for 486 megatons or approximately one-third of the U.S. nuclear warhead inventory. In early 1980 an improved guidance system, which will increase the missile's accuracy, was being retrofitted in these ICBMs (Janes, 1980: 14).[1]

Titan II is a liquid fuel system that is fueled by toxic aerozinc-50 and nitrogen tetroxide. The advantages of using liquid fueled boosters are that they can modulate

TABLE 7

SUMMARY OF U.S. ICBM SPECIFICATIONS

	Titan II	Minuteman II	Minuteman III	MX
Range (miles)	7,000	6,500	6,500	7,500
Payload	9 MT(1)	1+MT	3X170 KT	10X170 KT
Throwweight (1,000 lb)	7.5	1.0 to 1.5	2.3	8.0
Height(ft)	103.0	59.8	60.0	72
Diameter (ft)	10.0	5.5	5.5	7.7
Propellent	liquid	solid	solid	solid
CEP	0.7	0.20	0.12	0.05
Date deployed	1962	1966	1970	---
Number deployed	54	450	550	0
Inventory	?	50	200	0

SOURCE: Janes Weapons Systems (London: Paulton House, 1975, 1976, 1978, 1979, 1980) (Titan and Minuteman).

Multiple sources (MX).

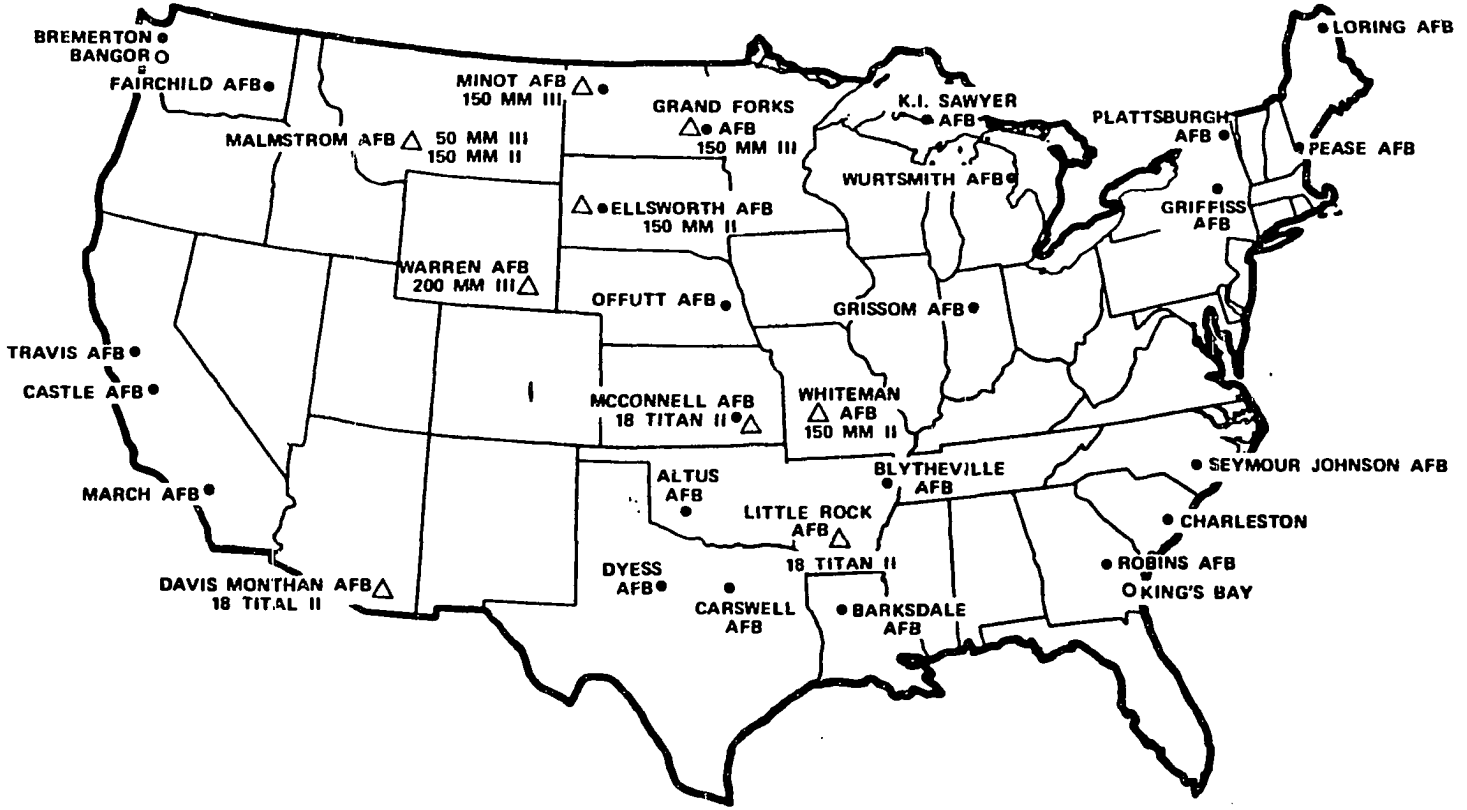
thrust to produce greater mission flexibility, they have high payload/launch weight rates, and they are lighter to transport without fuel/oxidizer. The disadvantages of the liquid fuel are that individually these substances are highly corrosive and ignite on contact with each other. The gaskets and seals with the system are damaged by the corrosive properties.

Most missiles in the U.S. inventory are test fired on an annual basis. Test data are accumulated for the primary purpose of determining system degradation. Titan has not been flight tested since 1976, but they have been subjbected to subsystems tests on statis firing stands. These test firings had to be stopped because all production facilities have been shut down and there are no spare parts remaining for such purposes (Huntsville Times, November 22, 1979).

Minuteman II and III

There are two versions of the Minuteman deployed in the U.S. These sites and quantities are shown in figure 4. Two of the sites contain Minuteman II, three have Minuteman III, and one site contains both systems (Collins, 1980: 135). The malmstron site in Montana is spread over an area of 18,000 square miles. Missiles are stored in individual hardened silos, eaching having a surface area of two or three acres. Each silo is approximately eighty-two feet deep and thirteen feet in diameter with two underground equipment rooms around the silo casing that extend to twenty-six feet below ground level (Janes, 1978: 14).

FIGURE 4
MISSILE/BOMBER BASES IN THE UNITED STATES



SOURCE: COLLINS, AMERICAN AND SOVIET MILITARY TRENDS, GEORGETOWN UNIVERSITY: WASHINGTON, D.C., 1978, P. 89.

Minuteman III is currently the most potent weapon in the U.S. ICBM inventory because of its accuracy and multiple warhead capability. It evolved from technological improvements to the Minuteman II. The initial modifications in the system were concentrated in the final stage and the reentry system. The significant change was the introduction of the MIRV system of three warheads.

The fourth stage of Minuteman III is a carrier of the MIRVed warheads. This carrier or bus has independent propulsion and guidance and control systems. The bus positions itself in the trajectory in accordance with a predetermined targeting mode and ejects a reentry vehicle (RV) when required. The MIRV does not have its own propulsion system and its flight is essentially a ballistic trajectory without a maneuverability capability. Each of these MIRVs may be of a different configuration. The bus may contain hot warheads, warhead decoys, mylar balloons, chaff (metallic or radar reflective material), or any combination of these items.

Modernization programs are in progress to upgrade the guidance and control systems and a replacement of the warheads (Janes, 1980: 15). General Jones (1980: 27) confirms the modernization program but indicates that it is directed to improvements in command authority communication links and the missiles' internal power systems. Production facilities for Minuteman III were phased out in 1978 (Robinson, 1979B: 180).

Mobile ICBM - MX

Developmental efforts in mobile ICBM concepts were accelerated in the mid 1970s.[2] Secretary of Defense Brown pointed out in his report to Congress on January 29, 1980, that the decision to proceed with full scale development of the MX reflected the current thinking that there are persuasive military and perceptual reasons for increasing the deterrent value of the ICBM component of the strategic force. He concluded that the protection of the ICBM is the best hedge against unexpected breakthroughs in Soviet anti-submarine warfare and air defense capabilities.

The MX program is the only significant U.S. land-based system being considered to counter the increased threat. When combined with Multiple Protective Shelters (MPS) basing, the MX provides a valuable counterweight to Soviet strategic momentum and future uncertainties in the strategic environment (Jones, 1980: 27). The MPS basing provides the preservation of location uncertainty concept through concealment of a missile in one of several shelters in a given area.

The proposed MX missile will be larger than Minuteman III and carry ten MIRVed warheads of higher yield. While its accuracy is classified, published data indicates accuracy to be within 300 feet of the intended target (Gray, 1978B: 105). Physically, the missile will be 70 feet long, 92 inches in diameter, and weigh approximaately 190,000 pounds (Air Force EIS, December 1980, vol. I: 1-14). The proposed

system has three primary components consisting of the missile, transporter launcher equipment, and the concrete shelters. The MX designation means "missile experimental." This definition is somewhat of a misnomer in that it is a straightforward evolution of the Minuteman III. Consequently, the MX concept has no significant technical or high-risk problem areas forecast in the deployment.

The proposed MX program consists of 200 missiles being placed in 4,600 shelters in such a way that the Soviet Union will not be able to tell which shelter contains the hot missiles and which contain decoys. The number of MPS is based on the perceived threat for the mid-1980s. From a targeting point of view, the Soviets are then confronted with 4,600 targets rather than 200. To eliminate the MX would require the Soviets to launch at least 9,200 one-megaton warheads (Kemp, 1980: 11-17). Because of the accuracy and reliability factors of the Soviet ICBMs, the incoming ratio to kill on MX shelter may be as high as 2.3:1 (Perry, 1980: 8).

The MX has a four stage propulsion system with three stages being solid propellant and the fourth or reentry stage being liquid. The first and second stages will use the same propellant as Minuteman II and the third stage will use the same propellant as the Trident SLBM (Janes, 1980: 15). The missile is encased in a canister that provides a controlled working environment and also serves as the launcher.

Secretary of Defense Brown (1980: 128) announced that MX would be equipped with an advanced design inertial reference sphere guidance system. This guidance system was developed for utilization with the mobile concept, and it permits the movement of missiles from one location to another without requiring a new location determination each time. Effectively, the system continues to navigate during movement.

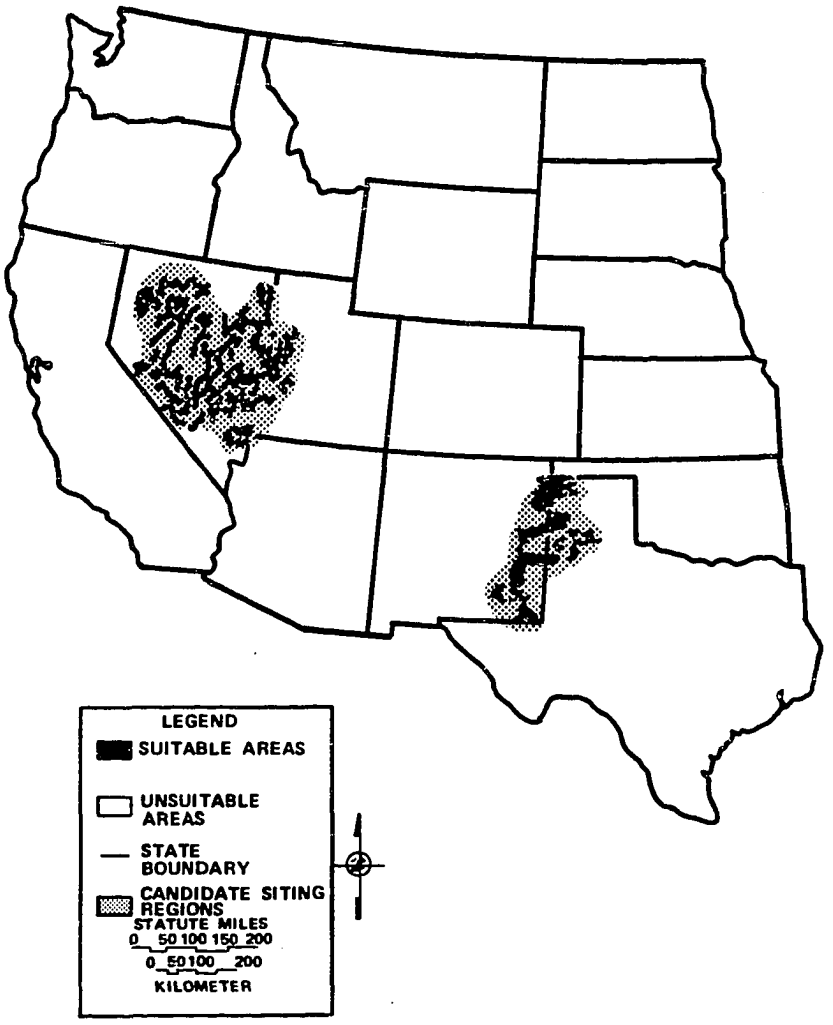
Suitable Basing Areas

The operational concept of the MX requires dispersion over areas of land that are large enough to provide mobility for preservation of location uncertainty (see figure 5). The Air Force (Environmental Impact Statement, December 1980, volume II: 2-5) selected Nevada and Utah as the preferred deployment area according to the following criteria:

1. The distance from the coast to the deployment area generally reduces the effectiveness of threatening sea-based forces. For physical threats, such as aircraft or missiles, added distance directly increases the time needed to reach that target, increases probable warning time, and allows more time for defensive reactions. For electromagnetic threats which are often limited to "line of sight" and "ground-wave" distances, the power requirements increase in proportion to distance.

2. The distance from international borders to deployment areas that are farther from borders reduces an enemy's capability to locate missiles in shelters through the use of sensors. The land surrounding the MX deployment area should be U.S. territory to avoid international complications in any investigation

FIGURE 5
SUITABLE BASING AREAS



SOURCE: U.S. AIR FORCE EIS DECEMBER 1980

of suspicious activities and to inhibit meaningful intelligence collections.

3. The distance from coasts and international borders reduces the effects of radio jamming against the MX communications sytem.

4. The existing land use activities must be compatible with MX deployment.

Basing Modes

The Air Force has studied thirty-five alternative basing modes during a twenty-year period. Alternatives considered included railroads, barges, wide-body jets, cargo-type aircraft, submarines, lighter-than-air-vehicles, ships, air-cushion vehicles, and trucks. The definition period also included basing in trenches, tunnels, pools, silos, canals, hardened capsules, excavated mountains, and various shelter configurations (Environmental Impact Study, December 1980: Program Overview, 1-5 to 1-8; also see ICBM Basing Options, 1980). Some of these high potential alternatives were feasible, but were eliminated after a period of time for various reasons. The trench, shallow underwater missile (SUM), and truck modes are in this category.

The hybrid trench concept is a covered trench hardened at specific aim points along the tunnel which extends for approximately twenty miles. Spurs lead off the main tunnel at angles with blast doors to protect the missile as it shuttles along the trench. The missile would be fired after breaking through the roof of the trench. Tests conducted by the U.S. Air Force in the Arizona desert revealed that the

trench concept is vulnerable to large warheads because of the possibility of warpage and cracking during attack (Robinson, 1977A: 47; also see Gray, 1978B: 111). The trench concept is confronted with technical and constructional uncertainties because of lack of experience in the techniques.

Shallow underwater mobile (SUM) missiles were an option under consideration that involves fifty or so small diesel-powered submarines, each carrying two MX missiles. These submarines would cruise within 200 miles of the Atlantic and Pacific coasts (Cooley, 1979: 6). Each submarine would be patterned after a West German built submarine of the same weight (approximately 500 tons) and would be manned by a crew of twelve men. Senator Mark Hatfield, a supporter of this concept, contends that the cost of the SUM missile would be about $12 billion and would be less likely to draw enemy fire on the continental U.S. He maintains that the system could be deployed by 1984 (Cooley, 1980A: 10).

Opponents of the SUM concept claim that the greatest threat to MX is not the Soviets, but a small vocal group of scientists on the fringe of strategic weapons design who are promoting pet schemes of dubious merit (Ulsamer, 1980: 35). Uslamer writes that the SUM missile would not be available until after 1990 and would be highly vulnerable to tidal waves (caused by nuclear explosions) in the relatively shallow waters. Alleviating the tidal wave problem would

require that the concept be switched to a Deep Underwater Missile (DUM), but this would be a competitor to the Navy's Trident submarine.

Adding an additional deployment to the submarine force does not present any additional problems to the Soviet diverse targeting problem, but making the ICBM strategic force less vulnerable does. The SLBM is not as accurate as ICBMs because the speed of the moving submarine with reference to a ground point is not accurate. Water currents, densities, and the depths from which they are fired attribute to the lesser accuracies. In comparison, the MX has published accuracy of 0.05 CEP, while the Poseidon has a factor of 0.3 CEP (Collins, 1978: 101). This problem could be overcome by assigning guidance and control function and capability to either ground control centers or satellite control stations.

The truck transport concept places a given number of missiles on the nation's highway system. Acquisition cost of this option would be minimal because no real estate is required. The transporter would be quite large and require supporting escort vehicles. This alternative was eliminated because of security of the system while in transit, the complex command and control system required to track the vehicles, the fact that large amounts of nuclear material would be on public highways, and the prohibitive weight factor (combined weight of missile, launcher, and transporter is 1,600,000 pounds).

The U.S. Air Force and Missile Systems Organization (SAMSO) selected the preferred basing mode after filtering through the following alternatives (Lenorovitz, 1978: 176):

-Construction of vertical shelters in the west and middle U.S. to hold Minuteman III but later to be filled with MX.

-Multiple aim point dispersal in vertical shelters in location same as the above.

-Multiple aim point dispersal in horizontal shelters in location same as the above.

-Construction of a number of buried concrete tunnels, each holding one missile. Uncertainty of missile location would require the entire tunnel length to be targeted.

-Development of either the horizontal or vertical launch concept or the tunnel concept and then use one of the other two as an alternate.

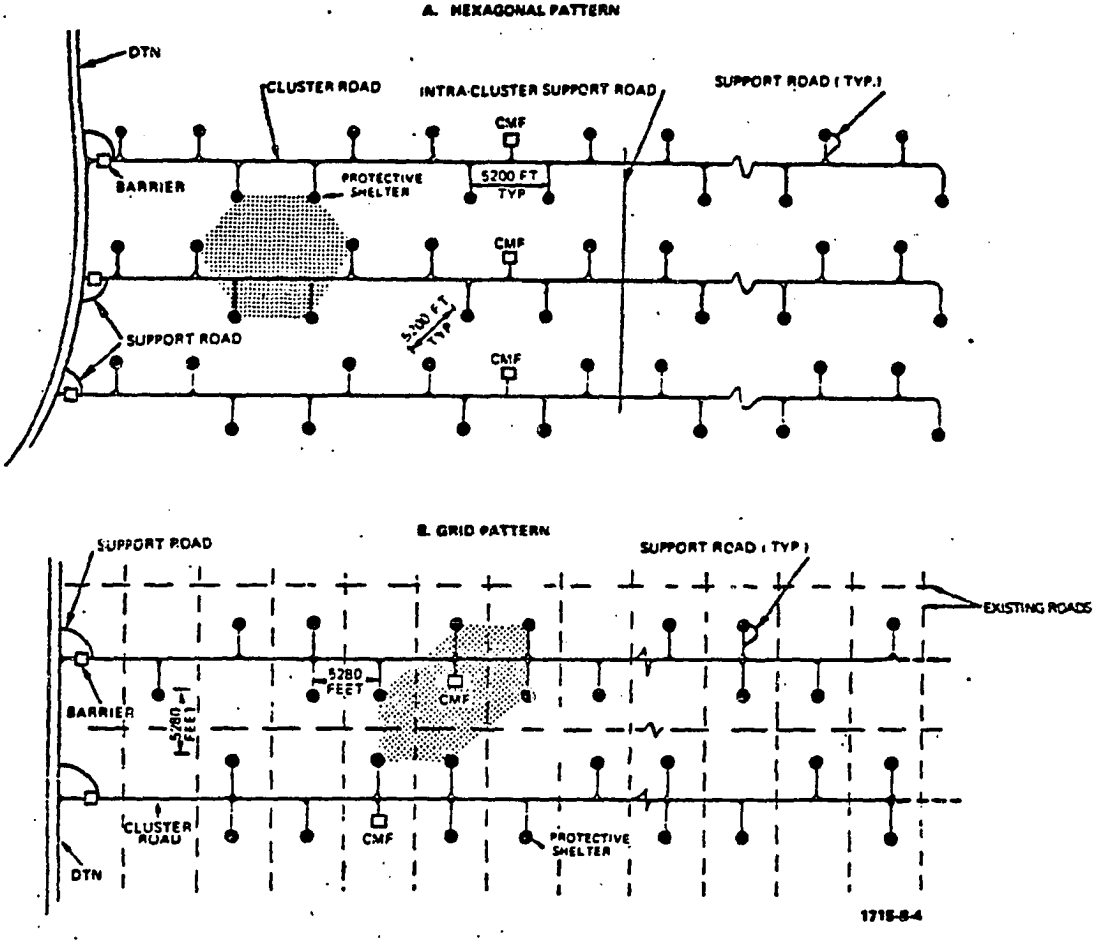
The following paragraphs describe the recommended basing modes and support hardware (Department of the Air Force, Environmental Impact Statement, Program Overview, dated December 1, 1980).

Horizontal Basing Mode

The horizontal shelter mode, in clusters of twenty-three with a hexagonal pattern and an average spacing of 5,200 feet between shelters, is preferred (see figure 6). Each cluster contains one missile/launcher and one transporter. Interconnecting roads are to be constructed to interconnect the hexagonal clusters, but in the case where existing roads may be utilized, an alternate grid pattern, depicted in

Figure 6

Horizontal Shelter Basing Mode



SOURCE: Department of the Air Force Environmental Impact Analysis, Program Overview, Volume I, December 1980.

figure 6, will be used. Secretary of Defense Brown, in testimony before the Senate Committee on Armed Services (June 5, 1980), stated that this linear basing concept makes more efficient use of the valleys in which the MX is to be deployed. Fewer valleys and less road construction would be required.

The protective shelter construction is a reinforced concrete, steel-lined cylinder buried under five feet of earth. The entrance door is made of concrete and steel. The electrical power command and control, and environmental control equipment, are buried adjacent to the shelter. The shelters are each located on a 2.5 acre site, unmanned, and remotely protected by monitoring devices. The main access to each cluster is blockaded with an earth barrier to prevent movement of the launcher transporter from one cluster to another. Smaller access roads circumvent the barrier for otherwise unrestricted access to the cluster. Shelter dimensions are 180 feet in length and 15 feet in diameter.

The launcher/canister is 155 feet in length, 110 inches in diameter, and 500,000 pounds in weight. Firing is accomplished after the canister partially emerges from the shelter or upon the open road. The canisterized portion erects to a near vertical position and the missile fires.

The transporter can be detached from the launcher canister. One transporter will be located in each cluster. Separation of the transporter makes possible provision for

a smaller tow vehicle than that required under the Transporter Erector Launcher (TEL) concept. The separation also eliminates the need of an additional vehicle shield since the transporter will provide the shielding during movement. The transporter moves the missiles about ten miles per hour, and is 201 feet long, 16 feet wide over the tires, 31.5 feet high, and weighs 1,600,000 pounds loaded.

The positioning of the shelter has been more controversial than the missile itself. The central issue in the question is the horizontal versus vertical launcher technique. Most members of the U.S. Senate seem to favor the mobility concept but express a concern about which shelter would meet the intent of the proposed SALT II Treaty. The debate relates to the point that the MX shelter is not a launcher and one MX per loop or cluster would be counted, not twenty-three; however, the vertical shelter concept resembles silos, silos resemble launchers, and launchers are surrogates for missiles under SALT (Robinson, 1979B: 17).

Nitze contends that legality of the mobility concept was settled during the SALT II negotiations (1979: 34 and 86). He writes that the Soviets stated that a vertical deployment would involve additional launchers which are prohibited by treaty; however, the transporter required for horizontal shelters might be considered a mobile system with each transporter being counted under the ceilings placed on launchers after the expiration of the Treaty Protocol. The Protocol,

article I, states that neither side shall deploy mobile launchers nor flight test mobile launchers, and article V stipulates that the Protocol shall remain in effect until December 31, 1981 or until it is replaced.

Antiballistic Missile Systems

The debate about which role to deploy an antiballistic missile (ABM) designed to protect cities or other U.S. missiles from nuclear attack was never settled. The debate was not settled on its technical or strategic merit so much as it was ended by the SALT process and by the anti-military sentiments generated in the Congress and the country at large during the Vietnam War (Lord, 1980: 31).

The ABM Treaty (SALT I), with the passage of time, has become such a fixture in American policy that it is assumed to be absolutely essential. The Soviet Union deployed one site (but only sixty-four of the one hundred were allowed) allocated to them by the treaty, while the U.S., after attaining operational status, disassembled its ABM site except for the radar. Research and development in ABM technology are permitted by the treaty and both the superpowers have been engaged in developmental programs (Flax, 1979: 41; also see Conine, 1981).

Emphasis has been focused on strategic offensive systems in the past few years; however, due to the increased threat to the U.S. ICBM strategic forces, the emphasis may

shift to include defense as an equal partner. The environment for survival of the second strike capabilities and the closely associated need for the survival of command and control functions associated with these systems are supporting this thrust.

The ballistic missile defense (BMD) strategic force modernization has begun to enter the strategic dialogue in the United States. The focus this time is directed toward BMD as a hedge against the rapid buildup of Soviet offensive weapons (Kemp, 1980: 11-17). The prestigious Los Alamos Scientific Laboratory has made studies of the developments in BMD and has determined that it now could be a feasible, cheap, and safe way to knock out incoming Soviet ballistic missiles (Cooley, 1980A: 10). The task is to apply emerging technologies that lead to economically feasible solutions and to defend against large numbers of incoming missiles. The goal is gaining a favorable cost-exchange ratio of making defense cost less in dollars than the cost of the offensive threat being defended against (Davis, 1979: 55-63).

The U.S. BMD approach is essentially a terminal defense system since it operates at the terminal or reentry leg of the ballistic missile trajectory. This concentration on the terminal period of the flight path is associated largely with the filtering effect of the atmosphere on ballistic missile reentry. The atmosphere slows the reentry

vehicles, and filters out many lightweight objects (Davis, 1970: 57).

The low altitude defense system (LoADS) is the front-running candidate for deployment as an ABM system. It is designed to be compatible with MX defense (Medalia, 1981B: 5). Because of its small size, the missile can be deceptively based in conjunction with any of the modes being considered for the MX.[3]

The LoAD missile is a single stage missile that has an outward appearance similar to that of the Sprint system that was dismantled as a result of SALT I. It is approximately half the size of the Sprint and is a solid propellant missile. Clusters of three interceptor missiles are bonded into a launcher canister, with each canister having is own small phased array radar that is approximately 1/40th the size of the phased array radar located at Grand Forks. The radar system is dormant until it is activated by early warning networks. The radar is assisted by optical sensors located in satellites, high altitude aircraft, or sounding rockets. The radar system utilized is electronically steered so time is not lost with a rotating disk antenna (The Huntsville Times, March 8, 1981).

Once a target is spotted and the decoys and garbage are sorted out, computers determine where the hot incoming warhead is going, and through an on-board modular missile-borne computer, the interceptor is directed toward

the target and a small nuclear warhead is detonated when it reaches the closest point to the incoming warhead. This entire engagement takes place in less than ten seconds and under ten miles altitude (The Huntsville Times, February 18, 1981; also see Medalia, 1981B: 5).

The LoADS concept has been developed with off-the-shelf technology and the components are derivatives of technology utilized in the Sentinel and Safeguard programs during the 1970s. The only exception to this off-the-shelf availability is the need to harden the components to nuclear effects to a greater degree than presently covered by experience scenarios. Because of its use of available technology, deployment of the missile system can be made compatible with that of the MX. Developmental test data are available that will permit the technological development of this hardening requirement.

MX Warhead Destructive Capabilities

Considerably less than half the present population of the world remembers the non-nuclear world. The first nuclear device exploded in 1945 produced an explosion of 19 kilotons (19,000 tons of TNT). Shortly thereafter, two bombs, one having a 12.5 KT warhead and the other a 22.0 KT, were dropped (Barnaby and Huisken, 1975: 119). By modern standards of nuclear weapons, those weapons would now be considered as tactical rather than strategic.

The warhead under consideration for the MX is security classified but assumed to be in the 300 to 400 kiloton range (Janes, 1981: 14). The reentry vehicle will contain up to ten of these MIRVs. This warhead, identical to the Minuteman III, is pre-positioned by the fourth stage reentry vehicle and ejected at a predetermined point. This process provides the capability to disperse these warheads over a "footprint" of approximately 1,000 miles long and 300 miles wide (Huntsville News, April 29, 1981).

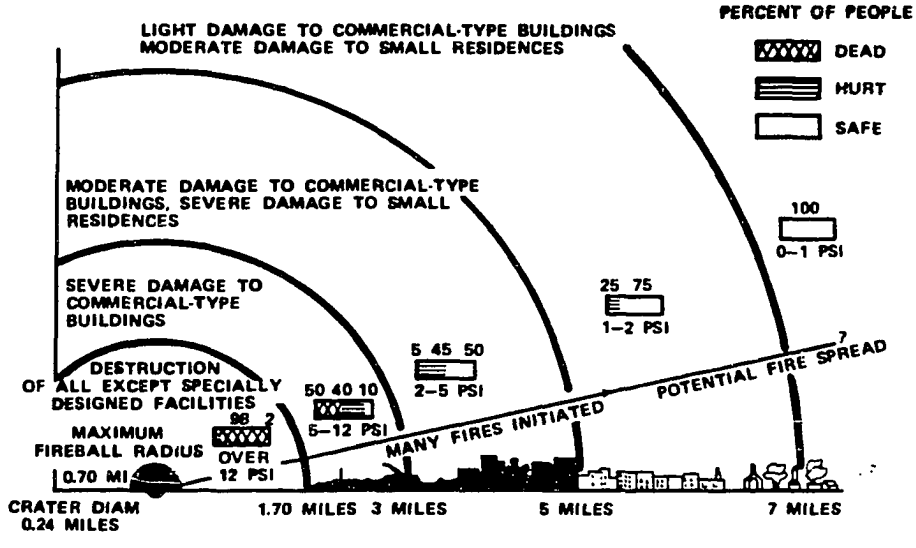
Figure 7 illustrates the direct effects of a one megaton and a 25 megaton surface blast (DOD Bulletin CPG 2-1A1, June 1973). The range of moderate damage and initial fires increases from five to fourteen miles. The figure illustrates surface blasts; however, an "air burst" at the appropriate altitudes would expand the diameter of the damage area by about 50 percent.

The areas of moderate damage and fire ignitions are large in either case, ranging from 80 square miles for a one megaton surface burst to about 625 square miles for a 25 megaton surface burst. The DOD Bulletin states that the average city of 100,000 population has an area of about 25 square miles. This figure indicates that only a few of the larger metropolitan areas would require multiple air-bursts for widespread damage.

Radiation fallout would occur, assuming 15 mile per hour winds, over an approximate area of 60 miles wide

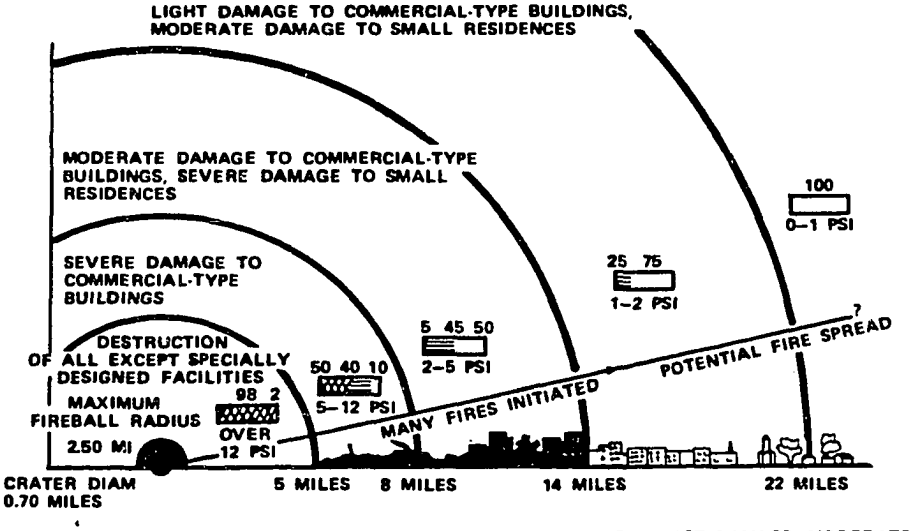
FIGURE 7
NUCLEAR WARHEAD EFFECTS

DIRECT EFFECTS OF 1 MT. BLAST (SURFACE BURST)



IF BURST IS ELEVATED TO ALTITUDE MAXIMIZING THE REACH OF BLAST DAMAGE MODERATE DAMAGE FROM BLAST AND INITIAL FIRES ON A CLEAR DAY ARE EXTENDED FROM 5 MILES TO 8 MILES

DIRECT EFFECTS OF 25 MT. BLAST (SURFACE BURST)



IF BURST IS ELEVATED TO ALTITUDE MAXIMIZING THE REACH OF BLAST DAMAGE, MODERATE DAMAGE FROM BLAST AND INITIAL FIRES ON A CLEAR DAY ARE EXTENDED FROM 14 MILES TO 22 MILES

SOURCE: DOE BULLETIN CPG 2–1A1, JUNE 1973, P. 8.

and 200 miles long. In the event that overlapping fallout from several weapons occurred, these fallout hazards would extend much further.

Summary

This chapter has described the ICBMs that are available to counter the threat to the land-based component of the U.S. defensive triad. Two long-range systems are in use that have become questionable in terms of the ability to survive an incoming attack because of improved Soviet accuracies and increased numbers of offensive systems.

The Titan system has been degraded by its corrosive liquid fuel system and, in part, by its fixed base deployment mode. Improvements are still being incorporated into its guidance and control systems.

Minuteman II and Minuteman III are the current mainstays in the ICBM defense system. These are solid fuel systems that have been deployed since the late 1960s and early 1970s. The production programs of both these systems are complete and their numbers limited by the pending arms limitation agreement.

The purpose of the proposed MX is to alleviate the survivability question with its deceptive mobile basing concept. The MX will incorporate the latest technologies that will make it the most accurate system in the U.S. ICBM inventory. The basing mode is controversial and has not been selected. An ABM system may be deployed with MX that is intended to enhance MX survivability.

The next chapter is an evaluation and comparison of these weapons as an ICBM defensive system. The analysis will indicate the deployment problems to be anticipated if the MX system is deployed.

Chapter V Endnotes

[1]General David Jones, Chairman of the Joint Chiefs (1980: 27) confirms the new guidance system for Titan in his report to Congress. He did not mention what the improvement was.

[2]MX technology was generated by an advance ICBM technology program originally proposed to extend the life of and increase Minuteman capabilities. In 1971, the Strategic Air Command documented the requirement for an advance ICBM. The design specification called for a large throw-weight to partially correct the asymmetry in throw-weight when compared to the Soviets' high survivability, increased accuracy, and more MIRVs than Minuteman (Medalia, 1981: 1-2). A review of back issues of Aviation Week and Space Technology show that MX site location study contracts were awarded in early 1976 and definition studies of the MX flight computer and guidance and control systems were awarded in late 1977. The full-scale developmental contract for MX was awarded in September 1979 (Janes Weapons Systems, 1980).

[3]LoAD is most effective when considered with the mobile basing concept because of the leverage factor. For example, if one hot MX is located in one of twenty-three horizontal shelters, then theoretically two incoming rounds would be required to eliminate each silo. Eliminating the properly targeted incoming round with a LoAD would require the launching of the third incoming round to destroy the MX. Because of the uncertainty of location of the hot MX, there is still a question about whether or not the round was destroyed.

CHAPTER VI

EVALUATION AND COMPARISON OF ALTERNATIVES

Introduction

The preceding chapter described the technical and operational characteristics of the U.S. land-based ICBMs. Two of these, Titan II and Minuteman, are fixed-based and have been deployed for a number of years. The proposed addition to the land-based system is a mobile concept that is dependent upon preservation of location uncertainty of the missile in order to enhance survivability. The low altitude air defense system that may be deployed in conjunction with the mobile concept is included. (Table 7, p. 101, summarizes these ICBM speficiations).

This chapter evaluates and compares these alternatives in order to identify the trade-offs of various choices for retaining the integrity of the defensive triad system. The evaluation criteria selected represent the most serious concerns about the land-based component of the U.S. defensive triad. These include deterrent potential,

environmental impacts, vulnerability, verifiability, and soical and political impacts. Table 8 identifies specific measures of each of these criteria.

The purpose of the large land-based systems is to contribute to the overall prevention of attack on the U.S. Since the level of deterrence created by a particular weapon system cannot be measured exactly, the factors that contribute to international stability are evaluated. The basing-mode contribution is dependent upon the site's being in a fixed location or a multiple protective (mobile) shelter configuration. Reliability is measured by the ability of the system to perform when it is needed. Accuracy is measured by the circular error probable (CEP) factor. A weapon system is considered accurate if the CEP is 0.4 or less. Utility is measured according to how long the weapon is expected to have a useful life. Normally the expected life of a weapon system is fifteen to twenty years.

Environmental costs and risks are measured by the land and water resource requirements. Environmental impacts are measured by the additional amount of land required for a deployment, the length of time to restore or repair environmental damage caused by site construction, and the amounts of additional water and electricity required.

Vulnerability of the fixed-based ICBM is the issue that brings up the necessity of deploying additional weapons. Weapon system vulnerability is greater when it is fixed or in a permanent position than when it has a mobile capability.

TABLE 8

CRITERIA FOR EVALUATION

Criteria	Measures
Deterrent Potential	
1. Does it contribute to international stability?	a. A weapon system is stable if it does not present a first-strike threat, measured by its age, degree of technological sophistication (e.g., MIRV capacity), and whether it is detectable (i.e., its flight time and trajectory).
	b. A weapon system is unstable if it is not susceptible to a first strike, measured by its mobility and silo hardening.
2. Is it reliable?	a. A weapon system is reliable if it has been tested within three years and it has current logistics support.
3. Is it accurate?	a. A weapon system is accurate if it has a CEP of 0.4 or less.
4. Does the weapon have long-term utility?	a. A weapon system has long-term utility if it has at least 15 years of active service remaining.
Environmental Cost-Risk	
5. What will be the land requirements?	a. A weapon system has high land requirements if more than 5,000 acres are required.
	b. A weapon system has low land requirements if less than 5,000 acres are required.
6. What will be the extent of land modification?	a. A weapon system has a high degree of land modificatio if the disturbed land cannot be restored during the lifetime of the system.
	b. A weapon system has low land modification if the land can be restored within the lifetime of the system.

TABLE 8--Continued

Criteria	Measures
Environmental Costs/ Risks (continued)	
7. How much water will be required?	a. A weapon system his high water requirements if the demands are a large percentage of remaining supplies.
	b. A weapon system has low water requirements if its demand are a small percentage of remaining supplies.
Vulnerability	
8. Can the system survive an enemy attack?	a. Survivability of a weapons system increases with hardened silos (3,000 psi or more)
	b. Survivability decreases if the weapon system is perceived to be a significant threat to the enemy.
	c. Survivability increases if the weapons system is mobile.
Verifiability	
9. Can the weapn system be verified by existing technologies (national technological verification)?	a. A weapon system can be verified if it is fixed based.
	b. A weapon system can be verified if it is observable at an assembly or cluster area, or if observation points are used.
Social and Political Costs/Risks	
10. Is the weapon system politically acceptable?	a. A weapon system is politically acceptable depending on the degree of opposition from major politicians --e.g., governors in affected areas, key congressional committee chairmen, and executive office officials.
11. Is the weapon system socially acceptable?	a. A weapons system is socially acceptable if it is supported by public opinion both regionally and nationally.

The verification criterion has been the most difficult issue to negotiate in strategic arms limitation. Verification is measured by whether the site is known. Fixed-based systems are verifiable.

Social and political acceptability are measured by the support of the system by public opinion and by congressional opinion. This criterion is measured by the results of available survey data.

In explanation of the terms appearing in this evaluation, stability and vulnerability are not synonymous terms. Stability of a weapon system is the perception of the threat of the system to an adversary. Vulnerability of the system is the susceptibility of the system to attack. For example, the SLBM would be considered unstable and invulnerable because of the difficulty in locating the submarine (launcher). Survivability and stability are at odds. Survivable systems create unstable perceptions to an adversary. Survivable systems enhance retaliatory strikes. Credibility is a perception of the system that is related to reliability, accuracy, and the general belief that the system will perform as it should.

Evaluation of Alternatives

Common Fixed-Based Criteria

The fixed-based ICBM systems have certain evaluation criteria that may be evaluated concurrently. These common characteristics, in this evaluation, are enviornmental impacts, vulnerability, and verifiability.

Environmental Impacts

The environmental impacts are not considered to be applicable to the Titan II and Minuteman. These systems have been deployed for so long that environmental modifications to retain, modernize, or replace them with an equivalent system would not be required. In the event that a replacement program were initiated in the same deployment areas, the demand for additional natural resources would be negligible (Air Force Environmental Final Impact Analysis, December 1980: vol. IV--110-17).

Vulnerability

Minuteman is more highly vulnerable than Titan because of its reliability as a system and because of its fixed-basing mode. These characteristics would cause war planners to place priority on Minuteman targets rather than Titan II.

Improved Soviet missile accuracy is a threat even though the Minuteman system is in a hardened underground launch complex. Intelligence estimates of the survivability of this system vary. The Strategic Air Command estimates vulnerability for the Minuteman (due to the threat) to be approximately 40 percent (Daily Oklahoman, August 21, 1980); former Secretary of Defense Brown estimates it to be 90 percent (FY 81 Report to Congress); and incumbent Defense Secretary Weinberger contends that it is 90 to 95 percent (Aviation Week and Space Technology, May 11, 1981; also see Nitze, 1979: 24-25).[1]

The Minuteman vulnerability issue has been in question for the last ten years.[2] Questions concerning accuracy, reliability, timing, and fratricide effects are the primary issues raised in the debate. Fratricide is the destruction of one or more incoming warheads by the premature detonation of another.

Those who question the vulnerability argument do so from the basis that accuracy and reliability cannot be known because the ICBMs have not been fired from tactical silos and flow over actual trajectories. Because these ICBMs have not been fired over the North Pole, the effects of the magnetic fields on the missile trajectory and bias factors cannot be known. The timing of the warhead detonation cannot be accomplished with the precision required to prevent fratricide from occurring (Gold, 1981: 7-9).

The U.S. technical community recognizes that these problems exist but believes that the technology exists to place two warheads on a single target and make them work (Gray, 1981: 856). Gray contends that the Soviets can or have already solved these problems. The Soviets developed the MIRV technology and achieved an accuracy factor of 0.1 CEP or less. The timing, fratricide, and bias problems can possibly be solved also. Vulnerability can be reduced by hardening of the silo that consists of sheltering with reinforced concrete and other protective measures for electronic cabling and components. For example, standard reinforced concrete

construction or corrugated steel construction is adequate to build shelters at selected overpressures from 50 psi to 3,000 psi. The technology, design, and construction experience exist to build special shock-isolated shelters up to about 3,000 psi or one and one-half crater radii (Donley, 1979: 149; also see Medalia, 1981: 15). Some sources agree that the existing silos are hardened to 2,000 psi (Gold, 1981: 94). Gray also indicates that a 2,000 psi overblast capability is built into existing silos (1981: 856).

Although additional protective measures can be incorporated, Minuteman is considered to have a high degree of vulnerability. This assessment is based on Minuteman's basing mode and the accuracies of the Soviet threat.

Verifiability

Fixed-based launch sites are verifiable by satellite and intelligence networks with a high degree of certainty. Doubts relative to photographic verification capabilities were dispelled in 1981 by the television media showing how NASA examined the missing heat-shield tiles on the belly of the space shuttle Columbia. This examination was accomplished while the shuttle was in orbit (over 100 miles high) and on tiles less than one foot square in area.

The number of fixed-base silos, according to the SALT II treaty, is equal to the number of launchers counted for purposes of verification. The number is directly and continuously countable by national technical means (Fiscal Year

1981 Arms Control Impact Statements, February 1981: 63). Fixed-based systems have a high degree of confidence that verification can be accomplished.

Titan II

Deterrent Potential

Stability

Stability of a weapon system depends on how threatening it is to the other side. There is an inherent stability factor that accompanies the long-range ICBM. This stability factor is attributed to the fact that these missiles are fired deep from within the enemy territory. They have a high trajectory and relatively long flight time (up to thirty minutes) that make detection more probable. The flight time decreases the possibilities of a surprise attack. Thus, the ICBM stability would rank higher than that of an SLBM which could be fired from relatively short distances, and higher than the cruise missile, which could fly at tree-top levels and thus not be detectable.

Titan II is considered to be a stable system because its permanent location makes verification easier. Also, it is vulnerable due to Soviet missile accuracy. The Titan system causes almost no concern in the international environment because of the Soviet perception of the deployed system. The Soviets demonstrated this lack of concern when they refused during the SALT II negotiations to consider heavy ICBM

systems. The attempt was made to use Titan II as a bargaining chip during the SALT I negotiations. The proposed trade-off was to dismantle the Titan class of ICBMS as additional SLBM launchers were constructed. The U.S. strategy was to freeze SLBMs but the Soviets rejected the proposal. The Soviet intent was to defer scrapping older ICBM launchers while its submarine construction program continued. The Soviets did not want the older Titan replaced (Smith, 1980: 381-97). The Titan basing-mode contribution is very low because of the basing mode and the Soviet perception of the system.

The Titan II system has not been flight tested since 1976 (Huntsville Times, November 2, 1979). Subsystem's testing was conducted for a short period of time but was halted because production facilities were closed down in the early 1970s and adequate logistics support does not exist for such purposes (Daily Oklahoman, September 20, 1980). Flight tests demonstrate weapon systems' present capabilities and reflect operational degradation due to component aging. Because of the lack of flight test data and limited logistics support, the reliability of the system is assessed to be low level compared to systems which have been recently tested.

The Titan II, deployed in December 1963, is not considered to be an accurate system when related to 1981 capabilities. The published circular error probable (CEP) value is 0.5 (see figure 2, page 9). This 0.5 number

indicates that half of any given number of warheads will be delivered within a one-half nautical mile radius. Modifications to the guidance and control system were incorporated to improve the accuracy factor in 1980 (Janes, 1980: 14). Improvements to the CEP cannot be accurately assessed in the absence of actual flight test data. The Titan II is considered to be inaccurate.

Classes of weapons do not retain their utility for all time. Utilities change as strategic weapons' emphases change (Gray, 1980: 2). Utility of the system is the expected remaining useful life of the system. The life expectancy of a weapon system is normally fifteen to twenty years. The Titan system had already been in the field eighteen years. Titan utility is also assessed to be a low value.

Social and Political Impacts

The Titan system has aroused both social and political concerns because of the increasing number of accidents. The liquid fuels utilized in the system, toxic aerozine-50 and nitrogen tetroxide, are highly corrosive and ignite on contact with each other (Janes, 1980: 14). These corrosive properties deteriorate the gaskets and seals that cause leaks and subsequent fires. There were five major accidents and 125 minor incidents between 1970 and 1980 (Christian Science Monitor, January 9, 1981). These occurrences have happened at all of the sites. The latest accident occurred near Little

Rock, Arkansas in August 1980. This accident was caused by carelessness when an airman dropped a socket wrench that ruptured the fuel tanks. The subsequent explosion blew off a 750 ton sliding door, and the nuclear warhead was thrown several hundred feet away. The accident caused the evacuation of 14,00 residents (Christian Science Monitor, September 22, 1980.

Air Force Secretary Mark issued a statement following the accident that concluded that the weapon system was safe, supportable, and reliable. As a result, the Air Force was instructed to keep the missiles on alert and operational indefinitely (Huntsville Times, November 22, 1979).

On a deployed system, localized public opinion usually runs high against the weapon when accidents occur. Following the Little Rock incident, public interest groups organized a campaign in Tucson, Arizona to have Titan removed from Davis-Monthan AFB. These groups further stimulated congressional debate over the safety and effectiveness of the system. These interest groups have included the notion in their argument that because of the location of the missile site, Tucson is a sponge for incoming missiles. County government officials countered this argument with the idea that they also do not like having the missiles located there, but they really are not capable of determining the national defense needs (Daily Oklahoman, September 25, 1980).

Public and congressional opinions are considered to be low in opposition to the system. The opposition

appears to stem from the areas where the system is deployed as opposed to a national concern. Political opposition following these accidents seems to be elevated only to the degree necessary to satisfy the constituency; then it goes away. The impact of these groups on removal of these systems was negative because the missiles are still deployed (Panofsky, 1982: 50).

Minuteman

Deterrent Potential

Stability

There are two configurations of the Minuteman deployed in the early 1970s that form the backbone of the current defensive triad. Minuteman II, the older of the two, contains a single warhead delivery capability, and Minuteman III has a MIRV capability. Since the systems are similar except for the warhead, they will be considered collectively.

Minuteman II, like Titan, is considered to be a stable system because of its fixed basing. Minuteman III has the stability characteristics of the other fixed-based systems, but the MIRV warhead capability causes it to be viewed as an unstable system. The fundamental characteristic of MIRV is its ability to deliver different trajectories (Greenwood, 1975: 1). Maximum separation of these deployed warheads is approximately 300 to 400 miles in down-range separation. The instability is generated by the potential

destructiveness of a single target and its potential to exhaust a missile defense system because of numbers of RVs. Thus, although Minuteman is fixed-based, it is considered unstable because of the MIRV capability.

Minuteman is considered to be a reliable weapon system. There is a higher probability that it will perform when required than there is with the Titan. Approximately 90 percent of the Minuteman ICBM force is on constant daily alert as compared with 55 percent of the SLBMs and 30 percent of the bombers (Sunday Oklahoman, September 21, 1980). Reliability is further increased by annual test firings.[3] Even though production facilities for Minuteman were phased out in 1978, logistics support is maintained for the system (Robinson, 1979: 180). The continuation of the flight tests and maintaining a current logistics support program suggest that the weapon is reliable.

Minuteman is considered to be an accurate system because the published CEP is 0.1 for Minuteman III and 0.30 for Minuteman II. Modernization programs are in progress to upgrade the guidance and control systems (Janes, 1980: 15). General David Jones confirms the modernization program but indicates that it is directed to improvements in internal power and the command and control communication links (1980: 27).

In terms of utility, Minuteman is considered to have at least ten years of remaining useful life. Dependent

upon a number of variables, such as basic system design, propulsion system, perceived threat, and operational characteristics, this useful life can be either extended or cut short. Gray indicates that technical solutions to defense problems occur in twenty-year cycles (1981: 856). Utilizing these parameters, Minuteman could be expected to remain a credible system until the late 1980s.

Social and Political Impacts

Review of literature and personal interviews have not indicated a social impact similar to that experienced by Titan. This observation may be attributed to the low profile maintained by the Minuteman deployment. The solid propellant rocket motors are more stable in nature, and the published accident rates are virtually zero. The Air Force stated in its December 1980 Environmental Impact Statement (volume 1: 1-48-1-49) that there have been no ignitions or liquid fuel leaks in the history of Minuteman.[4] There is very little opposition to the missile located in the Great Plains area. Dr. Colin Gray (Director of National Security Studies, Hudson Institute) writes that the Air Force has an almost embarrassing degree of support around existing Minuteman fields from the local farming population that act as unpaid security forces (Christian Science Monitor, August 8, 1980). Some of the silos are located in wheat fields, and the farmers have questioned people being in the immediate area.

Politically, the vulnerability of Minuteman has created an increased interest in the system. In June 1980 the Senate Armed Services Committee considered authorizing 100 multiple warhead missiles in addition to the 550 Minuteman IIIs that are already deployed (Sunday Oklahoman, June 15, 1980). Senators Gordon Humphrey and Harrison Schmidt, in a joint news release (June 13, 1980), contend that this extra deployment would signal the Soviets that the U.S. is beginning to reverse its strategic decline. This proposal was opposed in the hearings by Secretary of Defense Brown and Air Force Chief of Staff Allen on the basis that Minuteman will be 90 percent vulnerable during the 1982 to 1983 period (Committee on Armed Services Hearings, June 5, 1980: 2649). The resultant benefit would be 10 percent more warheads at a cost of $45 million.

Thus, Minuteman is considered socially acceptable based on the fact that there is virtually no public opposition to Minuteman. Political impact is also low. This low impact is based on the point that Minuteman is presently deployed, it is a low profile system, and it is not politically controversial.

MX

Deterrent Potential

Stability

The threat raised by the accuracy and numbers of new Soviet weapons is that anything in a known fixed position

could be destroyed. This fact suggests that providing a survivable ICBM force would require a combination of mobility and concealment. The MX has evolved as a land-based mobile system whose position is concealed among multiple, widely dispersed, and horizontal protective shelters, most of which are empty at one time (MX Education Bureau, November 1980): 3). The basing-mode contribution of MX to stability is a divided issue and there are valid arguments for both sides.

The rationale for the support of MX and the design of the system are such that an attack against the United States would be more unlikely once MX is deployed. By keeping the location of any one missile secret, the MX will make the cost of launching an attack against the U.S. extraordinarily high with little chance of success. Consequently, the mobile system will be an effective deterrent to attack (MX Education Bureau, March 1981: 4; also see Gray, 1981: 756).

Gray (1979: 67-68) writes that the time is long past when consideration should be given to decisions that halt or delay weapon programs on the allegation that they would be provocative in Soviet eyes. The Soviets have continued with the development and deployment of counter-silo capability weapons, and Gray contends that there is no evidence to suggest that there has been any change in their belief that nuclear wars can occur and are winnable. Gray

concludes that the MX is essential to the U.S. if it is to maintain an adequate strategic force.

As an advocate for MX deployment, Gray contends that MX will be a stabilizing factor that will deter the Soviets from pressing further down the counterforce path. Suitably deployed with a possible preferential terminal ballistic missile defense, the Soviets could not profitably target MX. Since the MX cannot be effectively defeated, it may give them an incentive to negotiate a draw-down in offensive systems.

The decision to proceed with the MX will advise the Soviets that no gain will be realized in the pursuit of strategic advantage (Ulsamer, 1979: 39). Senator John Stennis, chairman of the Senate Committee on Armed Services (June 5, 1980), stated that the decision to proceed with MX is very important in that the Soviets must understand where the U.S. is going with the MX. This understanding of the importance of communication to deterrence supports proposition four (chapter III, p. 81) that states the need for adversaries to inform each other of their defensive posture through a succession of signals.

Under-Secretary of Defense for Research and Engineering Perry (1979: 1285) notes that MX is a stabilizing factor in that it is advantageous to the U.S. to have the same counter-silo capability as the Soviets. If the Soviets perceive their ICBMs being made vulnerable by MX they may

be motivated to revert to smaller mobile ICBMs simialr to the MX. The smaller Soviet missiles would be less threatening to the U.S.; thus, stability for both the superpowers would be enhanced. Ulsamer, editor of Aviation Week and Space Technology (April 1979: 62-63), supports Perry's idea that a smaller Soviet mobile deployment would contribute to stability (also see Fiscal Year 1982 Arms Control Impact Statements, February 1981: vii).

Melvin Price, chairman of the Committee on Armed Services, U.S. House of Representatives, advised President Carter by letter (April 24, 1980) that he considered that an MX deployment would negate the destabilizing impact of Soviet ICBMs. The system's characteristics of survivability and durability make a Soviet preemptive strike a doubtful tactic.

Those who oppose the MX deployment contend that it will cause instability in the international environment. Any deployment of MX that requires thousands of Soviet nuclear explosions to overcome it would obviously increase damage to the U.S. in case of war. MX concepts emphasize the exhaustion of the opponent's forces through large-scale attacks against the U.S. The U.S. would become a "warhead sponge" and an incentive for the Soviet Union to acquire enough missiles to destroy every site where a mobile missile might be located (Defense Monitor, August 1977: 7; Collins, 1980).

The MX concept presents a new element in strategic thinking according to the editors of the Christian Science

Monitor (August 11, 1980). Nixon had formerly said that the U.S. would never acquire a capability that the Soviets could misconstrue; however, the MX because of its range, accuracy, and number of warheads appears to the Soviets to be capable of carrying out a first strike against the Soviets (Defense Monitor, August 1977: 7). This perception by the Soviets will create an unstable atmosphere under which they will then deploy their own mobile missiles.

The deterrent provided by the current U.S. strategic triad is credible to the Soviets according to Charles Yost (1980: 23).[5] The first strike capability that is now perceived as being so destabilizing to the U.S. will be more destabilizing to the Soviets if an equal number of MXs are deployed. Yost thinks that U.S. deployment will be more destabilizing because the Soviets have more than two-thirds of their strategic arsenal concentrated in land-based systems.

The deployment of the MX will not contribute to the stability of the U.S. deterrent, but will encourage a preemptive Soviet strike according to Kistiakowsky and Scoville (Christian Science MOnitor, September 11, 1980). In their view the MX will be perceived as an intention of a U.S. preemptive strike, regardless of which presidential administration claims it is for retaliatory purposes only.

The stability factor may have best been summarized by Admiral Henry Eccles (R) when he wrote that the nature and degree to which the MX system would influence Soviet

action is purely conjecture (Christian Science Monitor, April 3, 1980). He opposes the MX deployment on the basis that the present strategic inventories of both sides are complex and present enough danger without a deployment whose accomplishments are questionable.

The arguments on both sides of the mobile-basing issue contain valid points. Those who support MX as a stabilizing factor contend that Soviet perception of the proposed deployment should not be a consideration in the deployment decision. An additional advantage to the proposed deployment is portrayed as being a communication to the Soviet Union that no gain will be realized from the pursuit of additional strategic advantage. A final point for support of the stability of MX is that its deployment will force the Soviets to deploy warheads with smaller megatonnage capacity to launch a successful first strike.

The opponents of MX are of the opinion that MX may be perceived as having a preemptive strike capability which may trigger a first strike on the U.S. The proposed MX deployment could cause the Soviets to deploy a mobile system of their own that would increase the instability that presently exists.

There is validity to both sides of this debate. It is impossible to say with certainty that the MX will have a stabilizing or destabilizing impact. Based on the arguments just summarized, MX will be classified as unstable because it can be perceived as being a first strike system.

Although reliability data on the MX missile are not available, the missile is generally considered reliable because the design is based on proven concept (Air Force Environmental Impact Statement), December 1980, volume I: 1-46). MX, like Minuteman III, uses three solid-propellant booster stages and a small liquid-propellant post-boost rocket engine that have proven themselves with time. The system will be logistically supported and will have an active flight test program. Flight tests are scheduled to start in late 1982 (MX Education Bureau, November 1980: 10). Thus, the MX is considered to be reliable.

Accuracy

The MX will be the most accurate ICBM deployed by the U.S. to date as exemplified in table 7, page 101. The accuracy factor is based on the fact that it will contain the very latest technological capability. The guidance system contains an inertial reference sphere that provides a steady stream of information on the missile's movements during flight. The 0.05 CEP factor represents a target miss distance of approximately 200 to 300 feet for half of a given quantity of missiles from a distance of about 7,500 miles.

The MX will be deployed for at least the next thirty years. This time is not unreasonable, particularly when compared with Titan that has been in the field for eighteen years and Minuteman that has been deployed for ten years. Credibility of the system will increase with

time as flight test data are collected. The Soviets will no doubt monitor the test firings from Vandenberg to Kwajalien when they begin in late 1982. The Soviet monitoring program will improve the credibility of the system.

Utility of the system may be extended through application of technological modification. An advance development of a maneuverable reentry vehicle (MARV) or a precision guided reentry vehicle (PGRV) is in process. The intent of both programs is to provide, as a long-term hedge, timely options to respond to Soviet developments which may threaten viability of U.S. ballistic missiles (Fiscal Year 1982, Arms Control Impact Statements, February 1981: 51). ACDA indicates that there are no current plans to incorporate these capabilities into the MX. The utility of MX is assessed at a high level.

Environmental Impacts

Construction of the proposed MX shelter system and its connecting road system is one of the largest programs ever contemplated for national defense. The preferred Nevada-Utah deployment will be dispersed over 8,500 square miles with approximately 25 miles being fenced and excluded from public access. The area will contain approximately miles of new roads of which 1,400 will be paved and all will be open for public access (Department of Air Force EIS, December 1980: Summary, 3). The land to be withdrawn from public use in Nevada and Utah approximates 2.5 acres per

shelter. The total land withdrawn from public use in the Nevada-Utah area amounts to that required for the grazing of ten to twenty-five head of cattle or sheep per year. The federal government owns more than 90 percent of the land considered in the Nevada and Utah basing area (Rycroft and Monaghan, 1981: 40).

In terms of additional land required for the MX deployment has a high impact. The land includes more than 5,000 acres and is largely publicly owned. No additional land would need to be acquired for other existing ICBM-basing modifications.

The Air Force recognizes that the tentative deployment area in Nevada-Utah will be physically changed. Secondary effects to the natural environment will result from accelerated wind and water erosion, sedimentation, soil compaction, and altered surface water flow patterns. The natural recovery to the vegetation is not anticipated within the lifetime of the MX project (Air Force Environmental Impact Statement, December 1980, Summary: 17). The Air Force plans to initiate programs to accelerate the revegetation process in the affected areas by seeding, mulching, irrigating-minimizing repeated disturbance, and reapplying top soil.

Restorability

Restorability is a long-term, high impact issue because of the length of time required. The highways to be constructed will be available for public use except during

missile movement. A salient factor not contained in the Air Force EIS is that the highways to be constructed are permanent. These permanent roads will make many areas that are now somewhat secluded grazing lands accessible to more hunters and sightseers with their four-wheel-drive vehicles. The counterargument to this point is that there will only be a relatively small number of valleys (twenty-five to thirty) involved.

Resources Required

Almost every major decision in the West has been predicated on water availability (Boslough, 1981: 28). There are two public work efforts scheduled to be launched in the western United States during the 1980s. These developments will be competing for the resources available.[6] Both will place demands on human resources, water, and energy. Rycroft and Monaghan (1981: 1-2) contend that these programs are being pursued independently by different federal agencies with no regard for the cumulative impacts of the projects.

Energy development, the proposed MX deployment, and the growth of existing industries will be competing head-on for limited manpower, capital, and construction materials (Salisbury, 1981: 10). Salisbury cites a Western governor's office study that projects the growth due to energy projects to increase from 147,000 to 247,000 people in five years, with MX adding an additional 28,000 workers by 1986. The

study projects a demand of 128,000 new jobs by 1986, growing to 2.4 million by 1990.

Rycroft and Monaghan (p. 35) indicate an inflow of 80,000 people for the construction period, with an additional 60,000 during the operational period. The total influx is projected to peak at about 103,000 people between 1986 and 1989.

The Air Force Environmental Impact Statement (December 1980: Summary, 30) estimates 31,000 would be directly employed during the peak of project activity from 1986 to 1988 with a long-term employment level of 13,200 starting in 1991. The EIS includes the totals for competing developments and indicates that the cumulative impacts of MX and other large developments could produce as many as 77,000 jobs during the period.

Each of three projections of the numbers required is different. An errata sheet published after the EIS was distributed shows different personnel requirements from those shown above. The estimates are shown to illustrate the point that the influx of people cannot be precisely predicted except to say that it will be large in comparison to the present number.

The debate concerning availability of the necessary skills and crafts to deploy the MX is pertinent. Competition will exist in construction skills for laborers or craftsmen, such as carpenters or electricians. The competition

argument for an already acute shortage of engineers and management capabilities may not be as valid. The construction program will be managed by the people already employed within the Department of Defense (Graham and Nitze, 1979: 135). The Army Corps of Engineers will manage the construction phase, while the overall mechanical management and deployment will be managed by the U.S. Air Force from Norton Air Base.

Water

Water availability and the total demands and needs are potentially the most controversial public policy questions facing the West today (Devine, Ballard, and White, 1980: 231). The Air Force (Environmental Impact Statement, December, 1980: volume 1, 1-40) depicts the water requirement for the eight-year construction period to be 78,000 to 130,000 acre feet. The state of Utah projected about the same requirement for the construction period (Rycroft and Monaghan, 1981: 43).

The existing surface water allocations in the Great Basin area are complete (Ballard, 1981). Boslough (1981: 26-37) indicates that the Colorado River will not have capacity to provide additional water for deployment purposes. These water allocations can be purchased from the farmers who own them. The problems caused by withdrawal of water from agricultural uses will require political resolution (Ballard, 1981).

The greatest problem in the West is what hydrologists call water mining (Boslough, 1981: 35). Water is pumped out of the ground faster than nature can replenish it. According to Boslough, the general worry is not if the water runs out, but when.[7]

The Air Force (volume IV, part I, 4.23-4.26) recognizes that the most significant impact is the effect on ground water availability for competing water users. The lowering of water levels in existing wells may be long-term or short-term, affecting ground water availability through increased pumping costs or affecting the requirement for deepening existing wells. Additionally, the changes to the well depths could reduce natural spring flows and cause a general deterioration of water quality.

In both Nevada and Utah, approval of the state engineer is required to pump ground water. Predicated on existing data (data source not referenced), the annual ground water recharge capacity is fully appropriate, and none is expected to be available for MX consumption (Air Force Environmental Impact Statement, 1980: Summary, 10-13). Estimates of consumption during the life span of the program go as high as 121 billion gallons (Rycroft and Monaghan, 1981: 14).

The Air Force has considered the following broad alternatives to alleviate the water problems:

-Obtain water from outside sources such as the Colorado River and the city of Las Vegas.

-Incorporate water-saving features into base and support facility design.

-Use treated waste water for irrigation and other nonpotable uses.

-Utilize infiltration basins to return treated waste water to ground water reservoirs.

-Purchase water rights from existing sources.

The Air Force does not provide specific details on how to implement these alternatives. Boslough (1981: 26-37) indicates that the Colorado River will not have capacity to provide any water.

Energy Resources

The MX program will require electrical power and fuels for the construction period and in the longer thirty-year operational period. These demands for energy come at a period during which energy supplies are diminishing and competition from other anticipated developments is increasing. Energy in the form of electrictiy, gasoline, and diesel fuels is the primary requirement for MX. The peak construction demand for electricity by the MX project is estimated to be 150 MW annually with a peak operation demand projected at 180 MX. There is a construction operational period overlap in which the demand would be about 275 MW (Rycroft and Monaghan, 1981: 50; also see Air Force Impact Statement: volume IV, part II, 4-569; also see MX Education Bureau, 1981: 7).

The U.S. Air Force (Environmental Impact Statement, December 1980: vol. IV, part II, 456) contends that the

induced effects of MX on the electrical energy situation will not place any new demands other than those new generation systems which have already been planned. Construction of the necessary distribution system will create a temporarily disruptive effect with the extensive installation of underground cables to each of the clusters. The requirement for electrical energy is to be coordinated with the existing utilities and will insure minimum impact. Rycroft and Monaghan (1981: 50) take exception to the claim by the Air Force that electrical energy requirements have been coordinated with the existing utilities. They quote an energy requirement study conducted by Fugro National, Inc., which states that MX requirements had not been included in the local utilities forecasts for the 1980s. The state of Utah MX Project Office verified the point that the electrical needs of MX had not been included in the state or local power projections for the 80s (Interview, September 24, 1981).

The requirement for petroleum products, including gasoline, diesel, and fuel oil, is 175 million gallons per year during construction and 60 million gallons annually during operation (Air Force Environmental Impact Statement: volume I, part III; 4-569; also see Gold, 1981: 166). The Air Force estimates that 42 percent of the projected consumption in 1985 for Nevada-Utah will be the induced requirements of MX (also see MX Education Bureau, 1981B: 7). These demands peak during the construction phase and diminish to

about 11 percent during the operational phase. Fuel allocations, in addition to the environmental impacts caused by the construction of the added facilities, will require adjustment in accordance with the Emergency Petroleum Act of 1973. These allocations freeze supplier-purchaser relationships as of some base period; however, they may be adjusted on the basis of dramatic population increases.

The authors of the Air Force study contend that a favorable impact may occur as a result of these energy requirements. Detailed studies are being conducted by the Department of Defense to look at possible solar technologies, wind, and biomass technologies such as alcohol and methane production (MX Education Bureau, 1981B: 7). Perry stated in his testimony before the Armed Services (May 1, 1980) that money was included for research for these solar technologies.

The proposed MX deployment in the Nevada and Utah Great Basin area will cause impacts in the environment and on natural resources. Damage caused by construction of the interconnecting roads and launch shelters will require more than thirty years to restore them to their present condition; however, steps are proposed to assist and accelerate the process. Questions regarding surface water allocations and ground water availability will require resolution. Energy sources for electrictiy, gasoline, and diesel fuels will require resolution. Alternate forms of energy sources may

be developed as a result of the deployment developmental programs. The influx of people required to deploy MX will necessitate federal funds for impact assitance. These environmental problems are significant, but satisfactory solutions may be found for them.

Vulnerability

The design characteristics of the mobile concept enhance the survivability of the MX. The horizontal basing mode provides the least vulnerable deployment because of the speed at which it can be moved from one MPS to another (MX Education Bureau, 1980A: 5; also see Perry, 1980: 17). As previously stated, each of the twenty-three horizontally based shelters can be visited and the simulated loading-unloading operation can be carried out in twelve hours.

The MX is vulnerable while the missile is on it transporter, outside its shelter, and in transit between shelters. Deployment sites located at greater distances from the coast provide additional reaction time to overcome this problem. The Air Force Environmental Impact Statement (December 1980: volume V, 5-8 and 5-9) includes the idea that potential Soviet technological advances over the next three decades could produce a boost-phase interceptor (launched from a submarine) to overtake the MX after it has been launched. The boost-phase interceptor's success will depend on its location and that of the MX launchers. This condition is minimized by placing the MX in the proposed Nevada and Utah inland locations.

Preservation of missile location uncertainty demands a new technology for protection of the missile that is based on deception and decreases its vulnerability (Office of Technology Assessment, 1981: 4). Secrecy of location of the hot missile is an essential aspect for the survivability of the MX. The detachable transporter facilitates maintenance of this secrecy. An MX simulator can be manufactured that produces the identical missile profile and reflective image; however, the detachable transporter does not have to be simulated and can move freely about the linear or loop road.

Shelter spacing also decreases the vulnerability of the system. The shelters are spaced about one mile apart since the shelter can be destroyed by a direct hit. This spacing precludes the destruction of two MXs with one incoming round.

MX vulnerability is directly related to its causing the most unstable deterrent situation. It will be the most vulnerable during its construction and early phase of deployment (Rycroft and Monaghan, 1980: 5). The deployment schedule now has an initial operational capability date of July 1986, but this date is totally dependent upon the selection of sites for deployment, the legal problems in land acquisition, and the public acceptance of the deployment. Ms. Chayes (May 1, 1980: 41-42), in the House Committee on Armed Services Hearings, states that the initial operational capability date

can be moved up approximately one year with additional money if the land acquisition process is fully streamlined and production decisions are made without a flight-testing program. She is not concerned about court litigation resulting from the Air Force Environmental Impact Statement, but she is concerned for the time the congressional committees take to consider the withdrawal of public lands to go with the preferred deployment sites in Nevada-Utah.[8]

Vulnerability can be reduced by hardening to the 3,000 psi overblast limit; but, in relation to the deterrent capacity, the Air Force may not find this process desirable. Hardening to the point that the MX can be destroyed by direct hit with a smaller warhead--i.e., a 200 kiloton capacity as opposed to a 5 megaton one--may be the factor that halts the Soviets' emphasis on the heavy missiles.

Those who contend that MX is as vulnerable as Minuteman base their arguments on a similar basis to that which was posed in the discussion on stability. MX is vulnerable because it invites saturation attack (Gold, 1981: 94). The U.S. will become a vast sponge for Soviet nuclear weapons (Defense Monitor, March 1979: 2). The MX is vulnerable because it invites mass attack (Collins, 1980; and the MX Information Office, Salt Lake City, Utah, September 23, 1981).

The people involved in the Office of Technology Assessment (1981: 5) write that the multiple basing cannot

assure survivability of the MX unless the number of shelters is large enough relative to the size of the threat. It is the contention of those composing the Office of Technology Assessment that none of the mobility concepts significantly alter the preservation of location uncertainty.

The vulnerability criterion is assessed to be a low level. This assessment is based on the belief that preservation of location uncertainty can be obtained through the hide-a-pea concept and the speed with which the hot missile can be relocated (see Office of Technology Assessment, 1981: 57).

Verifiability

The concept of the MX and of the required operational support areas has been designed in such a fashion that verification capability is improved (Air Force Environmental Impact Statement, December 1980: Program Overview, 1-42 and 1-43). The operations area is divided into two general areas consisting of an assembly section and the deployment space where the clusters are located.

The missile and launcher components are delivered to the assembly facility where teams will take approximately one week to assemble and check out the missile, canister, and launcher. Once assembled, the missile launcher is transported over designated transportation networks to the cluster area. Assurance of verification and compliance with a strategic arms limitation agreement is provided by MX by following

certain procedures at both the assembly and the cluster areas. These procedures are:

- -Observable shipment of stage 1 boosters from the factory to the missile assembly area.
- -Observable assembly of the missile and launcher at a designated assembly area adjacent to, but separate from, other military facilities and all roads except one.
- -Movement of the missile and launcher to the cluster area only on the designated roads with a special observable and identifiable vehicle.
- -Blocking missile exits from the cluster area by barriers constructed across the access roads. Removal and replacement of these barriers is observable.
- -Periodic opening of observation ports in all structures and vehicles capable of concealing a missile and launcher in the cluster to verify that the proper number of missiles is present.

When the observation ports are closed, the transporter vehicle visits the remaining shelters and leaves the hot round in one of them. The remaining twenty-two shelters will contain simulators.

The utilization of simulators that give the same observable missile profiles enhances the survivability but further complicates verification by national technical means. This intrusiveness of the monitoring procedures and the amount of U.S.-Soviet cooperation required to monitor the mobile concept are without precedent in arms control (Meyer, 1979: 47-62). Meyer writes that the simulator verification can be overcome through a sampling procedure that requires a certain number of portholes, located in the tops of the shelters, to be opened periodically for satellite

observation. Given enough data, he thinks that the simulators can be distinguished from the hot round.

Meyer expresses a legitimate concern relative to the covert manufacture and concealment of assembled missiles. The mobile concept is conducive to this concern because of the missile-canister-launcher design relationship. These assembled units could be concealed in widely dispersed areas and deployed with almost any kind of mobile launcher (Gold, 1981: 99). This notion is supported by Perry's testimony before the House Armed Services Committee (May 1, 1980) wherein he states that the idea of deploying the MX tractor trailers on U.S. highways was rejected only on the basis of security problems involved with large amounts of nuclear material being moved on public highways. The technological advancement in the MX guidance and control section that permits a constant reprogramming of the location of the missile, in reference to some fixed point, further enhances the ability to conceal these missiles over wide areas.

Verification of MX is assessed to be a high degree or 90 percent probability that verification can be accomplished. The procedures and methods of MX movement and the opening of the portholes on a periodic basis lend themselves to verification by national technical means.

Social and Political Impacts

Political Impacts

Social and political debate abounds on both sides of the MX deployment issue. The governors of Utah and Nevada

have jointly agreed to oppose the deployment while some of their state and U.S. representatives support the issue (Utah MX Coordination Office, September 14, 1981). Local public interest groups oppose for environmental reasons, while local merchants are looking for all the business they can get. Congressional support or opposition lists concerning the MX deployment were not available as of September 1981.[9]

A newspaper editor in Delta, Utah, opposed, not because "she is nasty or unpatriotic," but because she is of the opinion that somebody in Washington found a Nevada and Utah road map and decided that this area would be a good place to put MX (Stevens, 1980: 13). The editor concluded that there was not very much going on in that area, but that was the way the local people preferred it. Utah State Representative Garth Jones stated that his primary concern was the fact that people, like the editor, did not seem to realize that the thing that gives them a chance to be free is a strong defense (Stevens, 1980: 13).

Utah's Governor Mattheson opposes the MX deployment in Nevada and Utah, but will support quick-fix solutions to existing systems or an MX type deployment at some other location (Christian Science Monitor, June 18, 1980). He agrees with the current assessment of the growing Soviet threat, but he thinks that the MX deployment is fatally flawed because it cannot be deployed until 1986. Additionally, he contends that Utah's greatest contribution to

national security lies not only in the possible deployment of a missile system there, but in its efforts to develop independent energy and mineral resources. He concludes that his state has a finite capacity to bear the demands of both.

The U.S. Senators from Utah (Garns) and Nevada (Cannon) both support the MX deployment with reservations (Senate Committee on Armed Services Hearings, June 5, 1980: 2630-3632). Senator Garns stated during the Senate Committee on Armed Services Hearings that he very strongly believes that something must be done to protect Minuteman III, but the issue is a two-part problem. The country is in great danger without MX; how and where the basing should occur are two parts of the issue. Garns stated:

> We have both newspaper and TV stations irresponsibly opposed . . . with statements that there will be nuclear tipped missiles in every valley west of Tooele, Utah, to California. That is ridiculous. There are tens of thousands of valleys . . . this deployment will require 35. This is the political climate we are dealing with.

Senator Garns attributed the greatest part of the political opposition to the fact that Nevada is 80 percent owned and Utah, 67 percent owned, by the federal government.

In the June 5, 1980, Senate Hearings, Senator Cannon somewhat indicated an approval of the concept but wanted the MX to be deployed using the split-basing concept (also see the Huntsville Times, August 9, 1980). He amended the appropriations bill to the point that the total procurement of 200 missiles and construction of 4,600 shelters

could be made, but only 2,300 shelters could be planned for actual construction in the Nevada and Utah area. He stated that his justification for this amendment was that he was only trying to keep the entire program from being killed.

Senators Garns and Cannon are attempting to ascertain that the socio-economic and environmental problems of deployment are thoroughly evaluated. They state that a missile base of 8,000 people is not very large unless it is placed in an area that contains fewer than one person per square mile and then it becomes extremely crowded.

The Mormon Church issued a negative formal position on the MX deployment (Anderson, 1981: A8). The position reads in part:

> Mormon pioneers went west to establish a base from which to carry the gospel of peace to the peoples of the earth. It is ironic and a denial of the very essence of that gospel, that in this same general area there should be constructed a mammoth weapons system capable of destroying much of civilization.

The statement requested that an alternative to the MX be found that would not make the nation an automatic target for enemy nuclear missiles. Gerard Smith, the former chief negotiator for SALT I, indicated that this was the most significant opposition movement to date that could stop the MX deployment (May 8, 1981).

An administration poll (San Diego California Sun, July 18, 1981) indicated that both the Republican-controlled Senate and the Democrat-dominated House would approve the

land-basing of the MX in Utah and Nevada if President Reagan desired. The poll showed a clear majority in the House with approximately 50 to 60 members leaning toward support and a two to one margin in the Senate.

Public Opinion

Nationwide public opinion polls have been conducted for the general attitudes about national defense but have not been conducted specifically about the MX ICBM system.[10] The majority of these polls indicate the desire for a strong national defense posture and express a willingness to spend the money to acquire the same (CBS, New York Times, July 1, 1981; Time, June 1, 1981; Gallup Poll, May 7, 1981; and Harris, March 2, 1981).

Public opinion polls taken in Nevada and Utah have swung from opposition to support for the MX.[11] The most significant data were published in the Desert News, September 14 and 15, 1981. This survey shows that 65 percent oppose the system, but 69 percent will support the Nevada and Utah deployment if President Reagan makes that decision.

Social and political impacts are considered to be high concerning the MX deployment. This is based on the premise that it is a large-scale, widely dispersed deployment whose need has been publicly questioned. Political support indicates that the missile is required and should be deployed, but the deployment should occur some place else. Localized public opinion data indicate that the MX system would be

supported in the Great Basin area if that is where President Reagan's decision places it.

MX Program Cost

Cost considerations for these alternatives have not been included as a part of this analysis. Cost data for some of the alternatives are simply not available. Cost data for the proposed MX are influenced by the unit making the estimate. The U.S. Air Force has estimated that the system will cost a total of $33 billion. The Congressional Budget Office's estimate is $60 billion and the General Accounting Office's estimate is $70 billion (MX Education Bureau, March 1981). The differences are attributed to utilization of different program baselines. Cost includes only baseline and not operating costs. Costs do not include site construction nor improperly applied inflation rates. Opponents to MX have quoted the program cost to include development, acquisition, and operation costs of $55.6 billion (Gold, July 30, 1981).

The Congressional Research Service (Medalia, 1981: 12) indicates acquisition costs to be $40.7 billion in FY 82 dollars, including development, procurement, and other basing-related items such as vehicles and physical security. Colin Gray (1981: 856) writes that MX will not be the most expensive weapon system to be built by the United States. Gray estimates the total MX program at $33.8 billion, the Minuteman at $40 billion, Trident at $39 billion, and the B-52 program at $54 billion.

Antiballistic Missiles

The evaluation of the Low Altitude Air Defense System will not follow the ICBM evaluation format. LoAD is being considered in conjunction with the proposed MX deployment. Data such as accuracy, reliability, and utility are classified and not available. Since LoAD will be deployed adjacent to MX, environmental repercussion will be overshadowed by the ICBM. Verification procedures for LoAD will be similar to those for MX. ABM vulnerability is not an issue since it has a very short life expectancy.

The issues important to the LoAD deployment concern the credibility and effectiveness of the concept, stability, and political impacts. These topics will be discussed in the following paragraphs.

Credibility and Effectiveness

The deployment of LoAD is an alternative to increasing the number of shelters in the MX deployment. A LoAD unit would be hidden in one of the twenty-three shelters in each MX cluster and programmed to intercept the first reentry vehicle approaching the shelter containing MX. Since the exact location of MX or the LoAD is not known, two reentry vehicles must be targeted at each shelter rather than one (Office of Technology Assessment, 1981: 112; Davis, 1979: 57; Gray, 1980: 42). Congressman Jack Kemp writes that the addition of two interceptors to each MX cluster

increase the leverage factor to 3:1 (1980: 17). Kemp states that this factor may be high, but the level of uncertainty faced by the attacker would also be high. This uncertainty, according to Kemp, is desirable to maintain deterrence (also see Medalia, 1981A: 5). The LoAD can be considered to be effective if it achieves an intercept probability of 50 percent or greater (Office of Technology Assessment, 1981: 117).

In terms of credibility, the LoAD's concept is highly credible (Medalia, 1981A: 1). The technical capability to hit bullets with bullets was demonstrated in the late 1960s and early 1970s at both high and low altitudes in the Sentinel ABM Program and its successor program, the Safeguard. Credibility of these initial concepts was questioned because they relied on a centralized computer system that controlled each site. Each site had to be capable of defending itself and defending the targets it was deployed to cover. Since no system can ever be considered 100 percent reliable, leakage occurs (some incoming missiles would get through).

The criticism of LoAD credibility has been overcome through use of modular design radars and computers with each deployed missile's being capable of firing independently or through the integrated command networks. Since the primary function of this concept is to defend hard targets rather than countervalue targets, leakage is expected.

Supporting this notion of credibility is the fact that LoAD is the result of about ten additional years of research knowledge added to that gained in the earlier ABM programs. The hardware and electronic components being utilized are not new developments, but are off-the-shelf technologies.

Stability

The opposing argument is that ABM defense is destabilizing or provocative. It is destabilizing in the sense that it threatens to fuel the arms race between the superpowers. The acquisition of an effective ABM system might give one side more of an incentive to launch a nuclear strike in a period of severe crisis (Lord, 1980: 12). Supporting this notion is the view that stable nuclear deterrence requires each side to possess an assured second strike capability to inflict unacceptable damage on the counter-value targets. Acquisition of an ABM may generate the perceived need for a preemptive first strike. By contrast, complete mutual vulnerability may be the most effective deterrent to nuclear war.

The conclusions drawn by an arms control symposium (Barnaby/Boserup, 1969: 212-15) were that ABM deployments would serve only to accelerate the rate of technological development in strategic weaponry. The ABMs are only measures of temporary importance, while the improved methods of attack that they would generate would be of greater importance.

The ABM promotes stability when the defense capability is unambiguous or clearly there (Scoville, 1979: 104). Further, as offensive forces are drawn down or limited by negotiation, the ballistic missile defense assets become more stabilizing (Davis, 1979: 55-63). ACDA views the ballistic missile defense activity as having no perceptible effects on crisis stability, escalation, or aftermath effects (Fiscal Year 1982 Arms Control Impact Statement, 1981: 197).

Political Impacts

The LoAD system, in conjunction with MX, is clearly forbidden by the ABM Treaty since it would use launchers and radars that are not of the permanently fixed type (Medalia, 1981A: 6). The treaty and protocol limit deployment to one site with no more than 100 launchers and 100 missiles. The treaty permits that site to be only in an area containing ICBM silo launchers. The ABM Treaty will be up for consideration of extension or abrogation in 1982.

An amendment or abrogation would represent no obstacle to the hawks who disliked the treaty from the beginning. Senator Jesse Helms is prepared to scrap the treaty in 1982 in favor of deployment. The Reagan Administration has not committed itself on the treaty but has taken steps to intensify research and development in ABM techniques (Pond, 1980: 12).[12]

Arms controllers generally do not oppose defense of the MX on the premise that whatever maintains invulnerability of weapons is regarded as stabilizing. There is a concern in the arms control community that abrogation of the ABM Treaty, when it no longer suits our purposes, will make the process of reaching negotiated agreements much more difficult (Pond, 1980: 12).

Some authorities argue that the Soviets have kept their ABM research and development effort at higher levels than the U.S. and are ready to field a new ABM system (Huntsville Times, March 8, 1981; also see Graybeal and Goure, 1979: 76). Intelligence estimates indicate that the Soviets are spending about one billion dollars a year on ABM development. The U.S. has spent considerably less. The FY 81 estimate was $265 billion (New York Times, March 11, 1981).

Congressman Kemp (1980: 16) writes that if a credible BMD system were available for deployment now, it would provide the Soviet Union with an incentive not to continue its buildup in offensive weaponry. Kemp does not advocate a unilateral abrogation of the ABM Treaty but wants an ABM system developed to the point of deployment. He concludes that this action would be an incentive to get the Soviets back to the negotiating table.

From a military point of view, the role of the ABM is essentially the same now as it was in SALT II--the protection of the ICBM strategic forces. From an arms

control point of view, maintaining the ABM Treaty in its present form would seem unacceptable. The Soviets should be contacted for clarification of the permissibility of site defense within terms of the present treaty (Lord, 1980: 38). Gerard Smith (interview 1980) believes that the subject should be discussed in the Standing Consultative Commission. Smith believes that the deployment site selected for the ABM Treaty can be changed by an amendment rather than treaty abrogation.

Senator Peter Domenici (New Mexico) requested a study from the Los Alamos Scientific Laboratory on the assessment of ABM capabilities (Cooley, 1980A: 10). As a result of this study, Domenici concludes that because of the strategic Soviet offensive advances, the possibility of an American ABM can no longer be ignored. He advocates very serious consideration of whether or not to continue the treaty in 1982.

Politically, consideration must be given to the possibility that deployment of an ABM will start a reaction, resulting in an escalation of the arms race. The impact of an ABM escalation requires a comparison to the threat posed by the continued Soviet buildup in offensive weaponry. The trade-offs become nightmares for defense planners and the resolution of this concern must be in conjunction with that of the MX question.

Weapon System
Evaluation Summary

Table 9 is a summary of the evaluation criteria measures. The table depicts the influence each criterion has on the weapon system evaluation. Specific emphasis has not been placed on any of the criteria that would lead to one best solution because policy and decision makers may place more emphasis on one criterion than on another.

Alternative Courses of Action

Do Nothing

Policy analysis provides for the consideration of a number of courses of action, one of which may be doing nothing. In the case of the ICBM strategic force, this option has severe impacts. The increasing threat from the improved accuracy and the continued Soviet buildup in accuracies and numbers of strategic missiles, in effect, eliminates the U.S. ICBM family as a deterrent. This elimination of the ICBMs reduces the triad to a dyad that permits the Soviets to concentrate on the remaining forces which have the potential to become vulnerable with the passage of time.

Retaining the fifty-four Titans in an active deployment status is paramount to a "do nothing" course of action. The construction technologies are obsolete even though they are still undergoing modernization programs. They are not considered as bargaining chips in negotiations, and the propulsion systems are hazardous. One alternative

TABLE 9
SUMMARY TABLE: COMPARISON OF WEAPONS

ALTERNATIVES	CRITERIA										
	DETERRENCE				ENVIRONMENTAL COSTS					ACCEPTABILITY	
	STABILITY	RELIAB'LITY	ACCURACY	LONG-TERM UTILITY	LAND REQUIREMENTS	LAND MODIFICATION	WATER REQUIREMENTS	VULNER-AB'LITY	VERIFI-ABILITY	POLITICALLY ACCEPTABLE	SOCIALLY ACCEPTABLE
TITANS	STABLE BECAUSE OF AGE AND IS NON-THREATENING	NOT RELIABLE BECAUSE OF LACK OF FLIGHT TEST	0.5 CEP IS INACCURATE BY CURRENT STANDARDS	SYSTEM NOW EXCEEDS THE ORIGINAL 10-15 YEAR ESTIMATE	NO ADDITIONAL LAND REQUIRED	NONE	NO ADDITIONAL WATER REQUIRED	VULNERABLE BECAUSE OF FIXED-BASING	FIXED-BASING FACILIIATES VERIFICATION	OPPOSITIONAL ON A REGIONAL BASIS	OPPOSITION OCCURS ON A REGIONAL BASIS
MINUTEMAN	UNSTABLE BECAUSE OF MIRV WARHEAD	CURRENT MAINSTAY OF U.S. ICBM FORCE	ACCURATE BECAUSE CEP. IS 0.1	HAS APPROXI-MATELY 10 YEARS RE-MAINING IN EXPECTED LIFE	NO ADDITIONAL LAND REQUIRED	NONE	NO ADDITIONAL WATER REQUIRED	VULNERABLE BECAUSE OF FIXED-BASING	FIXED-BASING FACILITATES VERIFICATION	ACCEPTABLE BUT NEEDS BACK UP OF NEW SYSTEMS BECAUSE OF SOVIET THREAT	IS ACCEPTED IN REGIONS WHERE DEPLOYED
MX	UNSTABLE BECAUSE IT MAY BE PRE-CEIVED AS A FIRST STRIKE SYSTEM	CONSIDERED RELIABLE BECAUSE DESIGN IS BASED ON PROVEN CONCEPTS	ACCURACY IS EXPECTED TO BE 0.05 CEP	WILL HAVE APPROXIMATELY 30 YEARS EXPECTED LIFE	DISPERSED OVER 8,500 SQUARE MILES WITH 25 SQUARE MILES FENCED	LAND CANNOT BE RESTORED TO NATURAL STATE IN THE NEXT 30 YEARS	121 BILLION GALLONS REQUIRED IN CONSTRUCTION AND DEPLOYMENT	NOT VULNERABLE BECAUSE OF DECEPTIVE BASING	AIDS TO VERIFICATION HAVE BEEN BUILT IN	MISSILE IS ACCEPTABLE, BUT BASING MODE IS CONTROVERSIAL	MISSILE IS ACCEPTABLE BUT BASING MODE IS CONTROVERSIAL
LOAD	STABLE BECAUSE ITS DEPLOYMENT MAKES MX LESS VULNERABLE	UNKNOWN	UNKNOWN	UNKNOWN	IF DEPLOYED WITH MX NO ADDITIONAL LAND REQUIRED	IF DEPLOYED WITH MX NO LAND MODIFICATION REQUIRED	MINIMAL IF DEPLOYED WITH MX	NOT APPLICABLE	SAME AS MX	POLITICAL DECISIONS CONCERNING ABM TREATY ARE REQUIRED	UNKNOWN

for these launchers would be to renovate the silos to accommodate fifty-four of the new MX systems that are under development. Because of Titan's single warhead, another option for its replacement could be to use fifty Minuteman II systems that also have single warheads and are already in inventory. This option would have no significant restraints to implementation.

Alternative courses of action in relation to the dispositioning of Minuteman II and III are not in order. Presently, they constitute the heart of the land-based ICBM family; and, because of the nature of their construction technologies and propulsion system characteristics, they can be kept in the inventory for an indefinite period. Modernization programs for implementation of approved technological innovations can be incorporated as the systems are removed from the silos for routine maintenance and inspection.

Implementation of this option occurs by default since they are already in place and meet the intent of the proposed SALT II Treaty. The constraint to the continuation of this option without a companion deployment of some type is the vulnerability issue.

Deploy Additional
Fixed-Based Systems

Additional fixed-based Minuteman III systems could be deployed in the existing Minuteman fields. This option would require restarts in all associated production facilities

since they have been closed down. The start-up of production lines and delivery of the first systems would require three to four years. This option would produce a relatively low risk production and deployment because of previous experience.

Barriers and constraints to the implementation of this alternative would come more from DOD than from social or political standpoints. Because of its basing mode, DOD maintains that additions of this nature are not cost effective in terms of relieving the vulnerability problem.

Convert Minuteman to Mobile Mode

This option, in conjunction with construction of additional silos to house the increased Minuteman missiles, could be accomplished in the existing deployment areas. The conversion could add the preservation of location uncertainty capability to Minuteman, which would reduce the vulnerability of the system.

By basic engineering design, the Minuteman was not intended to be deployed in the mobile mode; thus, portions of the structure and the fourth stage would require redesign if deployed in this mode. The time required to deploy this alternative would not permit operational capability during the peak of the vulnerability threat because of the redesign time and production start-up. Barriers and constraints to implementation of this option would be similar to those for increasing the numbers of this system in the fixed-base mode.

Deploy MX

This alternative retains the credibility of the ICBM strategic force and maintains the triad. The preferred option of the deployment in Nevada and Utah meets the desired site location parameters specified by the Air Force. System acquisition costs are minimized because the land required is primarily publicly owned and only thirty-five valleys out of the thousands available will be required. The expansion of the number of shelters, if required, can be accommodated within the existing clusters or additional real estate can be purchased. The deployment will contribute to the economic development of the area through an increase in the number of jobs available in both the construction and operational periods. The deployment is expected to cause development of renewable sources of energy that will also be available for commercial application. The current supply and allocation of existing water rights may not leave any available for consumption by the MX program.

Opposition to the implementation of this alternative appears to be regional and exists from the view that the system is required, the concept is good, but deployment should be made someplace else. Public interest groups and influential religious organizations are taking an active role in trying to prevent the MX deployment in Nevada and Utah. Public opinion polls indicate opposition to the system's being located in the preferred deployment area, but it

would be accepted if the president makes the decision to put it there. Congressional opinion polls indicate that the president's choice of deployment will be passed when it is brought up to vote.

The nature of the mobile concept will further complicate the already difficult task of negotiating verification of weapons systems. Cooperative attitudes between the superpowers will need to be intensified. The deployment schedule does not meet the required operational date to counter the threat at the proper time. The earliest anticipated deployment will occur in 1986 or 1987.

MX in Minuteman Fields

The primary advantage of this alternative is that the deployment would take place in a region that is accustomed to having these missiles as neighbors. Social and political disturbance would be minimal. Existing connecting roadways could be utilized with placement of the clusters among the fixed-base silos that are approximately five miles apart (Graham and Nitze, 1979: 135). Additional environmental changes would result in a minimum impact since much of the construction would have been already completed. The same degree of system utility exists that accrues from the deployment of the mobile mode in some other location.

There are two major concerns associated with implementation of this alternative that virtually eliminate

this option. One is the problem caused by concentration. Concentrated deployment of the mobile concept in the same geographical area as Minuteman effectively places all the strategic land-based systems in one basket. Because of the concentration of targets, the accuracy factor of incoming rounds becomes less critical because there would be only one central targeting area. This would require the MX and Minuteman to fly through atmospheric disturbances more severe than planned for dispersed deployment areas.

The second concern is the arrangement of the existing silo patterns and spacing to utilize efficiently the potential of a fully mobile concept. The existing silo arrangement does not provide sufficient space to preclude the destruction of more than one ICBM with one incoming round.

MX with LoAD

LoAD, when deployed with MX in either basing mode, raises the ratio of incoming missiles to cause destruction of an MX to an estimated level of approximately 2:1 to 3:1. The LoAD in this defense of MX capacity would be a low profile deployment with a minimal social or political impact. The deployment can be accomplished by utilizing the shelters constructed for MX and by shuttling them around as required to preserve the location uncertainty. Systems acquisition cost would subsequently be restricted to that of the hardware costs. LoAD would present a relatively low

risk deployment because its design utilizes generic or off-the-shelf technologies. The deployment can be scheduled to coincide with the operational capability of MX.

Deployment of LoAD will raise the technical issue concerning its ability to defend a hard site target. This argument can be expected to center around a comparison of the capabilities of LoAD versus that of its forebears, the Sprint and Spartan. The LoAD concept is dependent upon the efficiency of the early warning networks to bring it to an alert status. Targets, when passed on to the LoAD radars, are within a ten-mile range of the LoAD launchers. The defensive nature of the system and its short range will require a different strategic firing doctrine from that of the MX. The LoAD firing doctrine could be a launch on acquisition mode because of this short range.

Resolution of the question regarding compliance with the ABM Treaty will be required. This issue may be brought up in a scheduled standing consultative commission meeting with the Soviets and raised to higher echelons of government if required. Gerard Smith, the U.S. chief negotiator for SALT I, contends that the treaty will not require amending to deploy up to 100 of the LoAD launchers but will need to be amended to change its location. Since the LoAD launcher is configured in pods or canisters of three missiles, a problem might be anticipated relative to the interpretation of the number of launchers (100 or 33) that can be deployed and remain within treaty limitations.

Summary

This analysis has considered the existing land-based missile systems of the U.S. defensive triad and the proposed mobile system in conjunction with a low altitude air defense system. All possible alternatives have not been considered in this analysis (see chapter I). There are other alternatives available such as the air-borne cruise missile and the split-basing approach to MX that may also be utilized. These are topics on which additional research may be required.

The final choice is made by the political decision maker and is based on personal priorities. If a decision maker perceives the increasing vulnerability as a threat to survivability of Minuteman but places more emphasis on preservation of the natural environment, then the conclusion might be reached that increased emphasis should be placed on the deployment of additional systems in existing Minuteman fields without an MX deployment. On the other hand, the decision may be reached to deploy MX to enhance Minuteman. This decision emphasizes the need to retain the triad and places secondary emphasis on the environmental and social impacts. The decision to deploy MX with LoAD places priority on the notion that the ABM Treaty has outlived its usefulness and changes are in order. Chapter VII contains the conclusions and courses of action recommended by the researcher.

Chapter VI Endnotes

[1]It is recognized that newspapers are generally not accepted as credible sources for research; however, two have been used. The Huntsville Times in Alabama has been used because there are four separate Army agencies located in Huntsville. Often the news releases originate with public information offices from these agencies and are credible. A series of articles appeared in the Daily Oklahoman in September and October 1980 that was written by Jack Taylor about the status of the U.S. defense readiness posture. I talked with Mr. Taylor several times about his sources of information. The readiness data that he published about missile systems about which I am personally knowledgeable was accurate. Any other newspaper references contained in this research have also been checked for credibility.

[2]The arguments contained in these paragraphs are typical of the debate about the vulnerability issue. Other sources for each side of the argument are Gen. Maxwell Taylor (R)--"There is no threat to out ICBMs because of the uncertain performance of their. . ." (Christian Science Monitor, September 8, 1981); Arthur Metcalf, military editor of Strategic Review--"Missile inertial guidance accuracies are greatly exaggerated. . ." (Christian Science Monitor, September 8, 1981); and "The Soviets inherit the same reliability problems in advanced technological systems as the U.S." (Panofsky, 1981: 49). "Soviet technological advanced have contributed to the growing doubt of survivability of the land-based leg. . ." (Congressional Digest, November 1980: 259); "Minuteman and Titan will soon lose their ability to survive. This danger results from improved accuracy of Soviet ICBMS. . ." (ICBM Basing Options, December 1980: 2); "Titan and Minuteman missiles will soon be vulnerable because of Soviet advances in accuracy and payload. . ." (MX Education Bureau, 1981: 1-2).

[3]The latest test firings were two unarmed Air Force Minuteman II ICBMs that were fired from Vandenberg Air Force Base in January 1981 (Huntsville Times, January 21, 1981; and personal interview). They were selected at random from those in an alert status on operational bases. The missiles landed about 5,000 nautical miles south of Hawaii, near Kwajalein Atoll. The Air Force Environmental Impact Analysis, December 1980: volume III, 111-5, states that twenty test flights were conducted in 1977. Numbers for subsequent years were not included.

[4]During the research process, back issues (78, 79, and 80) of Aviation Week, Space Technology and Air Force Digest were reviewed for ICBM data and no articles were

located that pertained to Minuteman accidents. Subsequent conversations were held with Air Force personnel associated with Titan and Minuteman that confirmed the Minuteman safety record. A third conversation (September 16, 1981) was held with an ACDA representative from the MX Program Office, who also confirmed the Minuteman record.

[5]ABC News program Nightline interviewed Admiral Laroque (R) (director of the Center for Defense Information and the Defense Monitor) and Paul Warnke (one of the SALT II chief negotiators) on October 1, 1981. Admiral Laroque's position is that credibility is maintained by the U.S. nuclear submarine fleet. Warnke said that the credibility of the ICBM was established by former Secretary of Defense Schlesinger in the mid-1970s. The Minuteman in the mid-1970s was established as being a non-vulnerable system.

[6]A comprehensive review of the concurrent development of the synfuels industry and the MX deployment was presented by Robert W. Rycroft (University of Denver) and James E. Monaghan (Office of the Governor, State of Colorado) to the Western Political Science Association meeting March 26-28, 1981. The presentation covered a range of policy issues surrounding the development of synthetic fuel projects and deployment of the MX.

[7]Interviews with personnel from the State of Utah MX Coordination Office and a public interest group representative from the Utah MX Information Office on September 14, 1981 revealed that data relevant to the amounts of surface and ground water available for MX are not known. Studies have been initiated to make this determination. These individuals indicated that the Air Force does not have these data either. This accounts for the generalities contained in the Air Force Environmental Impact Statement. The Office of Technology (1981: 67) supports the argument that the use of deep water reserves poses several problems, primarily that the relationship between the source of supply to the deep water aquifer and the existing surface waters cannot be precisely determined.

[8]Under-Secretary of the Air Force, Antonia Chayes (House of Representatives Committee on Armed Services, May 1, 1980) stated that the Air Force was well experienced in preparation of environmental impact statements. She said that the Air Force had been challenged in court four or five times and in each case the Air Force had prevailed. She fully expects court challenges in the MX statements.

[9]A request for this information was made to the Offices of U.S. Senator Heflin and U.S. Representative Flippo. Both advised that such information did not exist as of

September 1981 because the issue had not been brought up for a vote. See Congressional Digest, November 1980 for a review of some congressional leaders' opinions.

[10]Telephone calls were made to the Harris and Gallup polls, and Roper organization on September 4, 1981 to determine if public opinion surveys on MX might be available. None of these three organizations had made any surveys specifically on the MX.

[11]U.S. Senator Heflin's office provided a summary of public opinion polls that were provided by the Congressional Research Service. A New York Times/CBS News poll, July 1, 1981, indicates that 42 percent perceive the U.S. to be inferior to the Soviet Union in military strength (sample size 1,433 with a plus or minus 3 percentage point error factor). A Times magazine survey (June 1, 1981) indicates that 73 percent of those questioned were of the opinion that the U.S must build up military strength (1,221 sample size with a plus or minus 3.5 percent sampling error), while 22 percent were opposed. The Congressional Research Service also provided a number of statewide polls conducted by the Los Vegas, Nevada Sun and Salt Lake City, Utah Desert News from October 28, 1979 to September 14 and 15, 1981.

[12]The Reagan administration issued a position on May 22, 1981 (Huntsville Times) that there is no legal obligation to abide by either of the two agreements with the Soviet Union that limit strategic weapons. ACDA Chief Counsel Tom Graham and State Department Legal Adviser Arthur W. Rovine disagreed with the position but were overruled on this issue.

CHAPTER VII

CONCLUSIONS

Introduction

The task of forecasting future U.S. defensive systems has been hampered by a long history of failures. General Grayson Tate, U.S. Army Ballistic Missile Defense Program Manager (1980: 1-5) writes that as late as 1937 a technology assessment published by the government failed to predict the development of the jet engine, radar, inertial guidance, rocket propelled missiles, satellites, and nuclear weapons. The ability to effectively manage or control these emerging technologies has been no better than the capability to forecast them. Dr. Vannevar Bush, the first Director of the Office of Scientific Research and Development in the 1940s, wrote (1949: 8) that there is no need to fear the intercontinental missiles since they are not as effective as the airplane with a crew.

Strategic arms limitation treaties between the United States and the Soviet Union have only limited specific weapon systems and have not impacted the development

and deployment of the Soviet heavy missiles during the last ten years. The U.S. now finds itself with a potentially vulnerable ICBM strategic force due to the modernization of the Soviet strategic forces. Hopefully, the decision regarding the MX deployment will be made with greater vision and acumen than those described in the preceding paragraphs.

Research Questions

The focus of this dissertation was to evaluate several internal factors affecting progress in arms control and to analyze the proposed deployment of a mobile land-based ICBM in conjunction with a low altitude air defense system. The impact of three major factors--theories of deterrence, technology creep, and models of the decision-making and negotiations processes on the arms control process and the selection of weapons--were assessed. Much of the available literature is written about these factors separately; their collective impacts on weapon system selection for the arms control process is lacking.

Methodology

This research has taken an applied policy analysis approach to the problems of arms control and weapons system selection processes. Applied policy analysis is intended to inform decision makers about the consequences of taking various courses of action to solve a problem or issue. Five steps of analysis have been conducted:

-Problem definition

-Policy context description

-Identification of alternative

-Evaluation and comparison of alternatives

-Recommendations

The general model for applied policy analysis developed by White et al. was modified for use in the development of an integrated response to these research questions. Arms control and weapon system selection decisions require both technical and policy evaluation before final choices can be made. This model provided the general structure to review the existing institutional arrangements that exist for addressing national security issues and for interpreting the results of the technical evaluation in terms of the suggested factors that impact progress in arms control and weapon system selection.

Findings

The results of this research has added new perspectives to the internal strategic arms control and weapons system selection processes. First the application of applied policy analysis as a means of providing policy and decision makers a set of alternatives with the consequences of the courses of action that may be taken is new. Other types of analysis have been used such as highly complex mathematical models, but they have not included the political and social impacts as contained in this research.

The second perspective is that strategic arms control and weapon system selection are typically considered as separate issues. It is the researcher's contention that they are not. These are both national security issues that are resolved in the national security environment where the decision processes are the same and the suggested factors (decision making and negotiation, theories of deterrence, and technological advancement) impact both.

Decision Making and Negotiations

Arms control and strategic weapon system selection decisions are made by the president with advice from the National Security Council and from advisors who may occupy various positions in what may be referred to as circles of power. The president resides at the nucleus of the decision structure with assistance from advisors. Dependent upon the situation, the president may draw a particular individual for a specific situation or rely on the bureaucratic process for advice on long-term issues.

Two conceptual decision models--rational actor and bureaucratic--have been applied to arms control and weapon system selection choices. The rational actor concept is characterized by a small number of participants and an issue or problem which has overtones of being a crisis or requiring quick resolution. The bureaucratic concept is focused on the internal politics of government; the characteristics include many participants and an emphasis on compromise.

The national security decision process is unstructured with no fixed rules that apply from one situation to another. There is no requirement for the president to utilize the National Security Council and each of the presidents since the Johnson administration have used the system differently.

Johnson used the bureaucratic model concept for decision making. Johnson did not require alternatives from which to select; he wanted consensus or choices that had been agreed upon by the bureaucracy. His lack of direction or guidance for the preparation of SALT I caused a delay in the start of the first strategic negotiations with the Soviets. The impact of this delay was that the MIRV technology was deployed by the Soviets.

The sources of valid advice received by the president are not critical to the arms control of weapon system selection process. While Johnson's inner circle of advisors were trying to reach agreement on what should be contained in SALT I, a small group made up of members from the second and third circles of power prepared and obtained concurrences for an approach.

The ingoing SALT I negotiation recommendations derived by the Johnson administration were given to the Nixon administration. Nixon did not accept these recommendations but chose to have Kissinger study the issues. Nixon's choices were made from alternatives prepared by Kissinger.

There were very few people involved, but the review by Kissinger required approximately nine months (see chapter III). The review by Kissinger resulted in an almost identical pre-negotiation position that Johnson had given to the new administration. The choice had been made by a different conceptual decision model based on advice from a key member of the inner circle but the results were almost the same.

The Nixon and Kissinger method of dealing directly with the Soviets through secret meetings and direct back channel contacts during the SALT I negotiations established the precedent for later arms control negotiations. Secret discussions involving only a few people provides the opportunity for "give and take" discussions without loss of international prestige. Arms control negotiations were impacted by the fact that Nixon and Kissinger did not keep the negotiation team advised relative to changes or new proposals that they were considering. This practice undermines the credibility of the chief negotiator since he will be steadfastly defending the last position given him by the president.

The Carter administration attempted to change the process established by Nixon through conducting open meetings that were external to the negotiations. They found out quickly that this technique was not going to work. Vance's preparations for their administration's first Moscow contact were made public and were linked to the Soviet stance on

human rights. According to Talbot, within one week after Vance's return from this meeting, the Carter administration reversed their position and implemented the secret back channel approach. Information was not kept from the negotiation principals as had been done in the previous administration.

Initially in this research, decision making and negotiations were considered as two different processes. They cannot be separated because the negotiation process is an extension of the president and his inner circle of power. The relationship is directly impacted by the degree of control the president wishes to place on the chief negotiator. Gerard Smith stated that he had absolutely no leeway or personal discretion in the SALT I negotiations (May 1981). These tight controls are justified in arms control negotiations. Decisions of this magnitude should not be left to the discretion of one individual, not even the president.

The most significant impact of the decision making and the negotiation process is the U.S. approach to the negotiations themselves. There is a lack of understanding of the differences in the two cultures and their different approaches to negotiations (see chapter IV). The Soviets know that the U.S. negotiating teams are under pressure to produce results quickly, which causes impatience. The impatience creates an incentive for alternatives to be offered until the Soviets get one they prefer. This point is

supported by the numbers of options and proposals offered in SALT I and by the first proposal initiated by the Carter administration to drastically reduce the limits on the numbers of weapons to be retained by both sides. Secretary Vance prepared a position and at the same time prepared a fall back position which he discussed with the Soviet Ambassador prior to its being presented to Moscow.

The notion of linking arms control negotiations with Soviet behavior elsewhere in the international environment is invalid. It gives the appearance that a superpower is being rewarded for behaving in accordance with external wishes by being allowed to participate in an arms control treaty. The notion that the Soviets do not accept linkage in arms control issues is supported by international events prior to and during strategic negotiations and by statements made during negotiations (see chapter IV). After the Johnson administration had scheduled the first preparatory meetings for SALT I, the Soviets invaded Czechoslovakia. Also, after the SALT II Treaty had been signed by the presidents of both countries, the Soviets placed a number of troops in Cuba and refused to remove them. This incident was followed shortly thereafter by a Soviet invasion or incursion into Afghanistan and the U.S. refused to ratify the treaty. The U.S. Chief Negotiator Bernard Smith was informed by the Soviets during the SALT I negotiations that this was a no-linkage agreement.

Weapon system selection is an internal part of the arms control process. The decision-making environment is the same for both. Many of the same people have been involved in the preparation of the alternatives and choices for these strategic weapons and arms control (see chapter IV). Nixon was not aware of how many principals involved in the Johnson administration were in SALT I (Smith, 1980: 39). Many of the Nixon people were involved in the strategic arms environment during the Carter administration (Spanier and Ulsamer, 1978: 4). Over half of the appointments made by Reagan had previous government experience (Havemann, 1980: 675). Each of these presidents were given recommended programs (Nixon, the SALT I position; Carter, the ongoing SALT II; and Reagan, the proposed MX deployment) that were delayed for further study and yet the end results are not substantially different. The utilization of additional time to study these issues is questionable. Choices made are not substantially different whether there are few or many people involved in the decision nor does the sources of advice impact the outcome.

The implication for the MX-LoAD decision is that based on past performance the deployment decision will be long and drawn out. The precedent has been set by the continuity of the personnel involved in national security. The process will not be improved in the next two decades because those decision makers have been indoctrinated by the current ones (Nixon, 1980: 8).[1]

Deterrence

The third perspective is that it is accepted that arms control does not contribute to stability of deterrence (see chapter IV). It is the researcher's contention that the concept of deterrence impacts arms control.

Deterrence has a negative impact on the arms control process (see chapter IV). When a weapon system loses its value as a deterrent, pertubations occur in the arms control environment as weapon systems are selected to restore deterrence.

The overall concept of deterrence depends on credibility, stability, and vulnerability of the weapon system. Credibility of a weapon system includes the operational characteristics of the system with a consideration of the missile performing as anticipated and as an adequate response to the threat which it is intended to counter. Stability and vulnerability are related. Vulnerable systems create unstable deterrent environments. The issue of the increasing vulnerability of the U.S. fixed-based ICBMs is the primary reason for considering MX. Minuteman has been made vulnerable by the MIRVed warhead system that was not included in the SALT I Treaty and by technological improvements in accuracy that were permitted by the treaty.

There are several unknown factors to be considered in the vulnerability issue. First is the capability to launch a massive attack with such precise timing as to prevent

the fratricide effect from occurring (see chapter V). Second, there have been no tests to date to deal with the effectiveness of the ICBM systems when the combat environment is encountered. The third is the factor described as "bias" or the difference in distance from the intended target to the actual impact area. Since these missiles have never been fired under combat conditions and over the proposed flight paths, this error is unknown.

A new weapon system must have the ability to restore a perception of deterrence. For example, the MX has been determined to be the right kind of system to maintain strategic balance (see chapters V and VI). The missile has approximately a 7,500 nautical mile range and a capability of delivering twelve independently targeted warheads, with an accuracy of approximately 300 feet. Given these operational characteristics and a basing-mode that reduces its vulnerability, it can be used to maintain the strategic balance.

The overall impacts of a particular weapon are often not considered when it is initially selected. This is supported by the point that the Soviets did not consider the impact of the deployment of multitudes of heavy MIRVed systems. The Soviet stragegy that nuclear war is winnable is the prominent issue in their weapon system selection process. It may account for their preference for the larger warheads. On the other hand, the argument that the Soviets

do not accept the concept of deterrence may not be valid. They are being constrained from launching a preemptive strike for some reason. As some argue, this constraint is probably the credibility, to date, of the weapon systems they face. In summary, the concept of deterrence can remain in existence while being pressured from changes in the status of the attributes that contribute to the whole of deterrence.

Technology Creep

Technology creep can have a continual effect on arms control since very little control exists over research directions in hard science and technology; the world of academia desires funding through grants and studies while demanding freedom of research direction; the military-industrial complex is dedicated to the continual improvements of existing systems or applications for new concepts; and finally, there is the effort of individuals and small businesses who are constantly striving to strike it rich with a new concept. The tendency is to continually improve existing weapon systems and deply new systems which require development of a counter measure to restore stability. These improvements can contribute to stability through improved safety and communications techniques or, for example, make verification for arms control more difficult. Because of the loose control over developments and application of technological improvements perhaps the control emphasis should be shifted

to weapons systems testing programs of the end products.

The MIRV system is a prime example of how these innovations and improvements in technologies can come together to produce one of the most destabilizing weapon concepts that has emerged to date. It was a low profile program that came through the funding channels of government under the guise of improvements to existing systems. After it emerged, its importance to arms control was greatly underestimated by the arms control community.

Additional Research

Emphasis on long-range offensive weaponry is causing a revival in the interest in antiballistic missile defensive systems. SALT I permitted the continuation of research and development of the technology. The environment for survival of ICBM missiles for a second strike and protection of command and control functions associated with these long-range systems is supporting this thrust. Published data on the LoAD system indicates that it has a short intercept range (see chapter V). The implication for arms control and weapon system selection is why the emphasis on a defensive system to defeat the Soviets over U.S. territory. The question may be asked, Why is emphasis not placed on long-range defensive systems that move the combat environment away from the U.S. territory?

Research in the realm of development of a strategic nuclear policy to establish the national security goals is appropriate. Once the goals are established, the strategic weapons to meet these goals will need to be defined. The benefit of this additional research is that it may stop the cyclic shifts from long-range offensive weapons to short-range defensive weapons. Further research would be appropriate on the impacts of beam technology, the hunter-killer satellite concept, and the deployment of cruise missiles launched from stand-off long-range aircraft.

Recommendations

Based on the results of this research, the following recommendations are suggested:

1. The U.S. defensive triad posture should be retained. There is merit in the argument that diversity of weapons systems complicates the adversaries attack planning. Retaining redundant systems insures that there will be surviving weapons capable of accomplishing the deterrent mission.

Allowing the ICBM component of the U.S. defensive triad to be neutralized by an adversary's threat will increase the possiblity of nuclear war rather than decrease it. Reducing the defensive posture to a dyad permits the Soviets to concentrate research and developmental efforts toward countermeasures for defeating the remaining two defensive components.

2. Minuteman II and Minuteman III constitute the nucleus of the land-based leg of the defensive component and must be retained as is until they can be supplemented. Measures can be taken to enhance credibility and alleviate the vulnerability issue. Modification and technological improvements should continue on these systems for accuracy and extension of remaining useful life. Programs to convert Minuteman to a mobile concept should not be considered. The basic design is intended to be a fixed-base deployment and the conversion effort would be extensive. Production restart programs are needed that would require three to four years to reach production capability. Silo hardening modification can be made that will increase the survivability factors of the system.

3. It is recommended that 2,300 horizontal launchers be built in the Great Basin area and 200 of the MX missiles be placed on production contracts at the earliest possible time. This recommendation is based on the belief that the perceived threat is real, that the multiple protective shelter with its deceptive location of the hot missile capability is the least vulnerable, and that verification could be accommodated.

- It is suggested that 100 of the missiles be placed in the 2,300 horizontal launchers with 25 retained as logistics support. The remainder should be used to replace the operational Titans and to start replacement of the Minuteman II system.

- o The horizontal shelter utilizing the linear grid maximizes the impact of the land-based MX. It is mobile to the extent that it can be transported between shelters within the grid.

- o The deployment of the MX may produce a deterrent effect on the international environment that is not dependent upon the numbers deployed. Deployment of the MX with its long range, accuracy, and multiple warheads gives the U.S. the same counter-silo capability as the Soviets. Given that the stability perception of the mobile MX is controversial, the deployment with the terminal ballistic missile defense would make the number of incoming rounds to destroy MX large enough that it would not be a profitable target.

- o This phased deployment has a number of advantages:
  - MX development coexists with the development of the synfuel industries through decreased competiton for the resources required.
  - It reestablishes the triad concept and partially alleviates the perception that the superpowers are not strategically equivalent.
  - The remaining 2,300 shelters could be used as a bargaining chip in the next negotiations to reduce the growing numbers of Soviet ICBMs.

- The social, economic, environmental, and natural resources requirements are minimized.

o Public opinion polls taken in the proposed deployment area on September 4, 1981 indicate that the decision to deploy MX in the Great Basin area would be supported if the president elected to put it there.

o Constraints to implementing this course of action are:
  - Additional requirements for water and energy will be required with peak requirements occurring during the construction period. The additional requirements for these resources have not been coordinated with the states of Nevada and Utah. The amounts of these resources available during the construction period are unknown.
  - The proposed deployment must compete with the pending development of the synthetic fuel and other industries for skilled labor. The synthetic fuel development program is proposed to be at its peak during the time of MX construction. This will also cause large influxes of people into areas that currently do not have adequate facilities to accommodate them.
  - Implementation of this recommendation will require the resolution of the amounts of water and

and energy available than can be purchased or allocated for MX allocation. Federal impact assistance programs to alleviate the impact of the influx of people must be initiated.

- It is recognized that the peak of the estimated Soviet threat will occur in the 1985-1986 period before MX could reach an initial operational capability; however, it appears to be the system that can most quickly be deployed.

4. The LoAD should be deployed in conjunction with MX.

o MX deployed in the horizontal multiple protective shelter mode with LoAD increases the leverage of the incoming kill ratio by a factor of 2:1 or 3:1.

o Deployment of the LoAD with the MX grid system effectively reduces the cost of a LoAD deployment to that of the hardware costs. The LoAD canisters may be placed in the MX shelters. The LoAD deployment will not cause the social upheaval that its predecessor, Safeguard, did. Because of its short range, the system is not intended to defend countervalue targets.

o Constraints to implementing this course of action are:

- The ABM Treaty expired in 1982 and a political decision must be made concerning its renewal for an additional five years. Article III(b) of the original ABM Treaty permitted the deployment of an ABM system with a radius of 150 kilometers within a silo complex with no more than 100 launchers and 100 interceptors. Article XV 2 states that the parties shall have the right to withdraw if either decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. Either party can withdraw after giving a six-month notice.
- The ABM Treaty should not be abrogated in 1982. The assumption is made that the LoAD cannot be deployed prior to the MX operational capability date of July 1986. The ABM issues should be addressed now through the Standing Consultative Commission (SCC) channel. Since the Soviets have continued their ABM efforts, there may well be an interest in reviving the original article III(b) provision that permitted ABM deployment around the fixed-based silo fields. Using the SCC channel will further clarify and communicate the concern with the expanding Soviet offensive capability. If the threat

continues to intensify, the treaty can be abrogated with the six-month notice.

The development of nuclear weapons and intercontinental delivery systems has transformed the security status of the United States. These technologies have made preemptive attack and rapid retaliation possible. The attack-retaliate capabilities have increased the dependence on deterrence and the credibility of strategic nuclear forces as a means of preserving national security.

It is not sufficient for the United States to maintain a strategic triad if that triad does not pose a credible response. The MX and its multiple protective sheltering concept provides that perception. To this end it may be advantageous to the United States that MX can be perceived as a first-strike system.

Given that strategic nuclear forces provide the foundation for U.S. foreign policy in peace and war, they in themselves are not sufficient. Sufficient conventional weaponry and strategic planning for their use must be included in the debate about nuclear war avoidance. Maintenance of a balanced defense posture not only provides for national security but it also provides a basis for the negotiation of equitable arms limitations agreements. This balanced force must be of such a size and character that produces the perception that the United States cannot be coerced or intimidated.

Recognition must be given to the fact that the international environment is no longer a two-superpower relationship with the United States recognized as the nation at the top. Since the end of World War II, the Soviets have been steadily increasing their military strength to reach a point of parity with the United States. The United States, at the same time, was assisting the Western European allies, Japan, Korea, and the Republic of Taiwan, and others, in their efforts to regain their military strength. Preserving the democratic way of life in this changing environment requires large expenditures of funds and occasionally some inconvenience of having a weapon system located in the neighborhood. We, as Americans, must realize that if we continue to go to the dance--the fiddler must be paid.

Chapter VII Endnotes

[1]Personal interviews were held with some of the nation's leading arms control experts during the research and preparation of this dissertation. Some of these individuals are not listed in the personal interview section of the bibliography. Those not listed preferred not to be because of their present positions and roles in the national security program. Several attempts to interview former Presidents Nixon and Carter were made to no avail. Response from the Nixon offices indicated that his appointment calendar was full for the entire year of 1981; however, the request was placed on file for future consideration. Carter's appointment secretary stated that he was dedicated to the writing of his memoirs and could not be disturbed.

The inclusion of those interviewed in the bibliography does not constitute their endorsement of this dissertation. The conclusions reached are the researcher's own. The thrust of the dissertation and the conclusions were discussed with each of them. All agreed that the approach was sound and most of the conclusions valid. The disagreements were in the area of the MX site selection. One disagreed with the stated magnitude of the impact of technology creep.

A series of questions was prepared for these interviews. The basic questions were:

- In your opinion is the MX program required?
- How should it be deployed?
- Should the ABM be deployed with MX?
- How should the ABM Treaty changes be handled to accommodate the deployment?
- What are the most significant factors that impact progress in arms control?
- How could the arms control process be improved?

The responses given were highly opinionated; each person was convinced that his approach was the optimum. The interviews were from fifteen to ninety minutes in length. Some of these individuals are very skilled in the art of evading questions which they really do not wish to answer. The cooperation of all has been appreciated. Their responses have contributed to the contents of this research.

[2]For an excellent discussion on the history of ABM, see chapter 3 of the dissertation prepared by Dr. William C. Wall, University of Oklahoma, 1978, entitled "An Analysis of Management Control in a Complex Large-Scale Endeavor: The Safeguard Ballistic Defense System Program."

BIBLIOGRAPHY

Books and Articles

ALLISON, G. T. (1969) "Conceptual models and the Cuban missile crisis." The American Political Science Review LXIII (September).

ANDERSON, V. (1981) "Mormon MX opposition being heard." The Huntsville Alabama Times (May 6).

ALLEN, GEN. L. (1979) "The strategic nuclear scene." Vital Speeches of the Day XLV (January 1).

ART, R. J., and WALTZ, K. N. (1977) Technologies, Strategy, and the Use of Force. Quoted in P. M. MORGAN, Deterrence, A Conceptual Analysis, p. 20.

ASPIN, L. (1980) "Debate over US strategic forecasts." Strategic Review. United States Strategic Institute VIII.

BALLARD, S. (1979) "Policy analysis and the public sector: integrating quantitative and qualitative research." Paper presented at the 40th National Conference of the American Society for Public Administration," April 1-4, 1979, Baltimore, Maryland.

_____ (forthcoming 1982) "Water availability." Ch. 3 in Water and Western Energy: Impacts, Issues, and Choices. Boulder, CO: Westview Press.

BARBER, D. (1977) The Presidential Character. Englewood Cliffs, NJ: Prentice Hall.

BARNABY, F. and HUSKEN, R. (1975) ABMS Uncontrolled. Cambridge: Harvard University Press.

BARNET, R. J. (1973) Roots of War. Kingsport, TN: Kingsport Press, Inc.

BLOOMFIELD, L. P. (1979) "A critique of the post war experience." Policy Studies Journal (Autumn): 114-20.

BOSLOUGH, J. (1981) "Rationing a river." Science 81 (June): 26-37.

BRAUCH, H. G. (1979) "Neutron weapons: a West German perspective." In Negotiating Security. Ed. W. H. KINCAID and J. D. PORRO. Carnegie Endowment.

BROOKS, H. (1976) "The military innovation system and the qualitative arms race." In Arms Defense Policy and Arms Control. Ed. F. A. LONG and G. W. RATHJENS. New York: W. W. Norton & Company, Inc.

BULL, H. (1965) The Control of the Arms Race. New York: Praeger.

BUNDY, M. (1978-79) "Maintaining stable deterrence." International Security (Winter).

BURNS, J. M. (1968) To Heal and to Build. New York: McGraw-Hill.

BUSH, V. (1949) Modern Arms and Free Men. New York: Simon and Schuster.

CHAYES, A. (Under Secretary of the Air Force) (1980) "Status of the MX missile system." Committee on Armed Services House of Representatives (May 1).

CLARK, D. L. (1979) Politics of Arms Control. New York: Free Press.

CLAUDE, JR., I. L. (1964) Swords into Plowshares. 3rd ed. New York: Random House.

COLLINS, J. M. (1978) American and Soviet Trends. Washington, DC: Georgetown University.

CONGRESSIONAL DIGEST (1980) (November): 261.

CONINE, E. (1981) "A revitalized ABM system may play a major US defense role." Huntsville Alabama Times (March 11).

CONFLICT STUDIES (1980) 117 (April): 14.

COOLEY, J. K. (1980a) "Study finds defense against missiles can be cheap, safe." Christian Science Monitor (June 9).

_____ (1980b) "Can US keep its missiles ahead of Soviet technology?" Christian Science Monitor (May 16).

_____ (1979) "Small subs could serve as MX missile launch sites." Christian Science Monitor (October 11).

CRONIN, J. (1979) The State of the Presidency. Boston: Little, Brown and Company.

DAVIS, W. A. (Deputy BMD Project Manager of BMDSCOM) (1979) "Ballistic missile defense in the eighties." National Defense XLIV (September-October).

DAY, B. (1979) "Negotiating with the Russians." Air Force Magazine (September).

THE DEFENSE MONITOR (1979a) MX: The Missile We Don't Need. Vol. XIII (October).

_____ (1979b) The Obsolete ICBM. Vol. VIII (March).

_____ (1977) The $100 Million Mobile Missile. Vol. VI (August).

DEVINE, M.; BALLARD, S; and WHITE, I. (1980) "Energy from the western states of the U.S.A." Energy Policy (September).

DIESING, P. (1962) Reason in Society: Five Types of Decisions and Their Social Conditions. Urbana: University of Illinois Press.

DONLEY, M. B. (1979) The SALT Handbook. Washington, DC: The Heritage Foundation.

DOTY, P. (n.d.) "Strategic arms limitation after SALT-I." Arms Defense Policy and Arms Control.

DOUGHERTY, J. E., and PFALTZGRAFF, R. L. (1971) Contending Theories of International Relations. New York: Harper & Row.

DOWNS, A. (1967) Inside Bureaucracy. Boston: Little, Brown, and Company.

DOWNEY, T. J. (1976) "How to avoid monad and disaster." Foreign Policy 24 (Fall).

DYSON, F. J. (1973) "Arms control and technological change." In SALT: Problems and Prospects. Ed. M. KAPLAN. Morristown: General Learning Press.

ECCLES, ADM (R) H. (1980) "Scrap the MX plan." Christian Science Monitor (April 3).

EDWARDS, D. V. (1969) Arms Control in International Politics. New York: Holt, Rinehart and Winston, Inc.

FALK, S. L. (1967) The National Security Structure. Washington, DC: Industrial College of the Armed Forces.

FALK, S. L., and BAUER, T. W. (1972) The National Security Structure. Washington, DC: Industrial College of the Armed Forces.

FLAX, A. H. (1979) "Strategic defensive systems." National Defense LXIV (September-October).

FORD, G. (1980) A Time to Heal. New York: Harper & Row.

FRYE, A. (1974) "US decision making for SALT." In SALT--The Moscow Agreements and Beyond." Ed. M. WILLRICH and J. B. RHINELANDER. New York: Free Press.

GAILWAY, SIR R. P. (1978) The Crossbow. Technology and Arms Control. National Security Affairs Monograph Series 78-5 (September) New York: Bramball House, 1958).

GARTHOFF, R. L. (1977) "Negotiating with the Russians: some lessons from SALT." International Security 1 (Spring).

GELB, L. H. (1979) "The facts of SALT II." In Arms Control. Ed. W. P. LINEBERRY. New York: The H. W. Wilson Company.

GELBER, H. G. (n.d.) "Nuclear weapons, the Pacific, and SALT." SALT Problems and Prospects.

GOLD, D. (1981) Misguided Expenditure. New York: Council on Economic Priorities Study. Publication S81-3 (July 30).

GOODPASTER, GEN. A. J. (1978) "Epilogue." In Evolution of the American Military Establishment since World War II. Ed. P. R. SCHRATZ. Lexington, VA: Marshall Research Foundation.

GORDON, M. R. (1981) "NSC: a lower profile." National Journal (April 25).

GOWTHROP, L. C. (1969) Bureaucratic Behavior in the Executive Branch. New York: Free Press.

GRAHAM, W. R., and NITZE, P. (1979) "Viable U.S. strategic missile forces for the early 1980's." In Strategic Options for the Early Eighties: What Can Be Done? Ed. W. R. VAN CLEAVE and W. S. THOMPSON. New York: National Strategy Information Center.

GRAY, C. S. (1981) "The MX ICBM and nuclear strategy." International Defense Review 14.

_____ (1980a) MX missile." Christian Science Monitor (August 8).

_____ (1980b) "What the MX would do to Soviet defense planners." New York Times (April 16).

_____ (1980c) MX and the Future of the Land-Based Component of the Triad. New York: Hudson Institute.

_____ (1979) "The MX ICBM: why we need it." Air Force Magazine (August).

_____ (1978a) "Technology trends." Air Force Magazine (March).

_____ (1978b) "The MX debate." Survival XX (May/June). London: International Institute for Strategic Studies.

_____ (1975a) "SALT I aftermath: have the Soviets been cheating." Air Force Magazine (November).

_____ (1975b) "The limits of arms control." Air Force Magazine (August).

_____ (1974) "Defense and negotiations." Air Force Magazine (January).

GRAYBEAL, S., and GOURE, D. (1979) "Soviet ballistic missile defense (BMD) objectives: past, present and future." Ballistic Missile Defense Symposium. November 1-2, 1979. Harvard University.

GREEN, P. (1966) Deadly Logic. Columbus: Ohio State University Press.

GREENWOOD, T. (1975) Making the MIRV. Cambridge: Ballinger Publishing Company.

HALPERIN, M. (1974) Bureaucratic Politics and Foreign Policy. Washington, DC: Brookings Institution.

HARSCH, J. C. (1981) "Reagan quandary: arms vs. budget success." Christian Science Monitor (August 21).

HAVEMANN, J. (1981) "Inside the Reagan administration." National Journal (April 25).

HOEBER, F. P. (1978-79) "How little is enough." International Security (Winter).

HOEBER, F. P.; KASSING, D. B.; and SCHNEIDER, JR., W. (1979) Arms, Men, and Military Budgets. New York: Crane, Russak & Company.

HOLSTI, K. J. (1977) International Politics. 3rd ed. Englewood Cliffs, NJ: Prentice Hall.

JACOBY, N. H. (1969) Antiballistic Missiles Yes or No. New York: Hill and Wang.

JANES WEAPONS SYSTEMS (1975, 1976, 1978, 1979, 1980). London: Paulton House.

JANIS, I. (n.d.) Group Think.

JOHANSON, R. C. (n.d.) "Salt was never intended to disarm." Arms Control.

JOHNSON, L. B. (1971) The Vantage Point. New York: Holt, Rinehart and Winston.

JONES, GEN. D. (1980) "US air force overview." United States Military Posture. Reprinted by Aviation Week and Space Technology.

KAPLAN, M. (1973) SALT: Problems and Prospects. Morristown: General Learning Press.

KATZ, A. H. (1979) "SALT II and verification." Military Engineer 71.

KEMP, J. E. (1980) "US strategic force modernization." Strategic Review (Summer).

KISSINGER, H. (1979) The White House Years. Boston: Little, Brown, and Company.

_____ (1974) American Foreign Policy. New York: W. W. Norton and Company.

_____ (1961) Necessity for Choice. New York: Harper & Row Publishers.

KISTIAKOWSKY, G. B., and SCOVILLE JR., H. "Why Washington's 'new' nukes would be worse." Christian Science Monitor (September 11).

KLASS, P. J. (1978) "MX basing studies show vertical silo preference." Aviation Week and Space Technology (June 19).

LAMBRIGHT, W. H. (1978) Governing Science and Technology. New York: Oxford Press.

LEE, J. M. (1979) "An opening window for arms control." Foreign Affairs (Fall).

LEHMAN, J. F. (1978) "SALT: the radical change from Ford to Carter." Common Sense 1 (Fall).

LENOROVITZ, J. M. (1978) "Air force eyes ICBM basing options." Aviation Week and Space Technology (August 28).

LINDBLOM, C. (1959) "The science of muddling through." Public Administration Review (Winter).

LONG, F. (n.d.) "Arms control from the perspective of the nineteen-seventies." Arms Defense Policy and Arms Control.

LORD CARNES (1980) "The ABM question." Commentary 79 (May).

LUTTWAK, E. N. (1976) Strategic Power: Military Capabilities and Political Utility. Beverly Hills: Sage.

MacRAE JR., D., and WILDE, J. A. (1979) Policy Analysis for Public Decisions. North Scituate: Duxbury Press.

McNAMARA, R. S. (1968) The Essence of Security. New York: Harper & Row Publishers.

MEDALIA, J. E. (1981a) MX Intercontinental Ballistic Missile Program. Issue Brief No. IB77080. Washington, DC: Congressional Research Service.

_____ (1981b) Antiballistic Missiles. Library of Congress Issue Brief IB81003 (February 2).

MEYERS, S. M. (1979) "Verification and the ICBM shell game." International Security 4 (Fall).

MILSTEIN, M. A. (1981) "Science, technology and the arms buildup." The Bulletin of the Atomic Scientists (June/July).

MORGAN, P. M. (1979) "Arms control: a theoretical perspective." Policy Studies Journal 8 (Autumn).

_____ (1977) Deterrence, A Conceptual Analysis. Beverly Hills: Sage Publications.

MYRDAL, A. (1978) The Game of Disarmament. New York: Pantheon Books.

MX EDUCATION BUREAU (1980) MX: A Mobile Defense System. Rosslyn; VA: MX Education Bureau (November).

_____ (1981a) The MX: An Overview. Rosslyn, VA (March).

_____ (1981b) The MX: Some Questions and Answers. Rosslyn, VA (March).

NACHT, M. (1978-79) "In the absence of SALT." International Security (Winter).

NASH, H. T. (1973) American Foreign Policy: Response to a Sense of Threat. Homewood, IL: Dorsey Press.

NATIONAL SECURITY AFFAIRS CONFERENCE (n.d.) Proceedings of the 1975 Conference. Carlyle Barracks, PA: National War College.

NAVROZOV, L. (1979) "If pigs had wings." National Review (October 12).

NEWHOUSE, J. (1973) Cold Dawn, the Story of SALT. New York: Holt, Rinehart and Winston.

NITZE, P. H.; DAUGHERTY, J. E.; and KANE, F. X. (1979) The Fateful Ends and Shades of SALT. New York: Crane, Russak and Company, Inc.

NITZE, P. (1979a) "Preserving the ICBM leg of the TRIAD." National Defense LXIV (July-August)

_____ (1979b) "US strategic weapons development and the implications of SALT." International Defense Review 3.

_____ (1978) "Presidents and the development of national security policy." In Evolution of the American Military Establishment since World War II. Ed. P. R. SHRATZ. Marshall Research Foundation.

NIXON, R. M. (1980) The Real War. New York: Warner Books.

_____ (1978) The Memoirs of Richard Nixon. New York: Brusset & Dunlap.

_____ (1968) "Nixon defense program." Armed Forces Journal (November 16).

OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING (1980) ICBM Basing Options (December).

PANOFSKY, W. K. H. (1981) "Science, technology and the arms buildup." The Bulletin of the Atomic Scientist (June/July).

PERLE, R. (1973) "Superpower postures in SALT." In SALT: Problems and Prospects. Ed. M. A. KAPLAN. Morristown: General Learning Press.

PICKARD, L. A. (1979) "SALT I negotiations: a game theory paradigm." Policy Studies Journal 8 (Autumn): 122-27.

PLATT, A. (1978) The US Senate and Strategic Arms Policy 1969-1977. Boulder, CO: Westview Press.

POLYANI, J. (1966) Bulletin of the Atomic Sciences. Quoted in P. GREEN, Deadly Logic. Columbus: Ohio State University Press.

POND, E. (1980) "Deterring nuclear war: the immediate issues." Christian Science Monitor (August 29).

QUADE, E. S. (1979) Analysis for Public Decisions. New York: El Sevier.

RATHJENS, G. W. (n.d.) "Changing perspectives on arms control." Arms Defense Policy and Arms Control.

REPPY, J. (1979) "Military R&D: institution, output, and arms control." Policy Studies Journal (Autumn).

RHINELANDER, J. D. (n.d.) SALT--The Moscow Agreements and Beyond.

RIVLIN, A. M. (1971) Systematic Thinking for Social Action. Washington, DC: Brookings Institution.

ROBERTS, C. M. (n.d.) "The road to Moscow." SALT: The Moscow Agreements and Beyond.

ROBINSON, C. A. (1979a) "Exploitation of SALT ambiguities cited." Aviation Week and Space Technology on SALT. USA: McGraw-Hill, Inc.

_____ (1979b) "MX racetrack questioned in Congress." Aviation Week and Space Technology (November 12).

_____ (1977a) "Congress presses strategic changes." Aviation Week and Space Technology (October 10).

_____ (1977b) "ICBM guidance curbs arms planners." Aviation Week and Space Technology (July 11).

ROSENAU, J. N. (1967) "Premises and promises of decision making Analysis." In Contemporary Political Analysis. Ed. J. C. CHARLESWORTH. New York: Free Press.

ROSEN, S. J., and JONES, W. S. (1980) The Logic of International Relations. Cambridge: Winthrop Publishers.

ROWNEY, MAJOR GEN. (R) (1981) "How to negotiate with the Russians." Readers Digest (June).

RUSSETT, B. M. (1978) "SALT I and its background: readings from Scientific American. Progress in Arms Control. San Francisco: W. H. Freeman and Company.

RYCROFT, R. W., and MONAGHAN, J. E. (1981) "Cumulative impacts of energy and defense projects in the west: synfuels and the MX." Paper presented at the Annual Meeting of the Western Political Science Association West, March 23, 1981, Denver, Colorado.

SALISBURY, D. F. (1981) "On collision course: MX missiles and energy development in the west." Christian Science Monitor (March 31).

SCOTT, W. F. (1975) Soviet Sources of Military Doctrine and Strategy. New York: Crane, Russak & Company, Inc.

SCOVILLE JR., H. (1979) "The arms control implications of new ballistic missile defense technologies." Ballistic Missile Defense Symposium, November 1-5, 1979, Harvard University.

SHAPLEY, D. (1978) "Technology creep and the arms race." Science Magazine (October 20).

SHEAR, J. A. (1981) "Arms control reorganization clues Reagan disarmament policy." Christian Science Monitor (August 20).

SHULMAN, M. D. (1979) "SALT: through the looking glass." In Negotiating Security. Ed. W. H. KINCAID and J. D. PARRO. Carnegie Endowment for International Peace.

SKOLNIKOFF, E. B. (1967) Science, Technology and American Foreign Policy. Cambridge: The M.I.T. Press.

SMITH, G. (1980) Doubletalk. New York: Doubleday and Company, Inc.

SNYDER, G. H. (1961) Deterrence and Defense. Princeton: Princeton University Press.

SOUTHERLAND, D. (1981) "Talks with USSR to come after US 'armed to parley'." Christian Science Monitor (August 17).

SPANIER, J., and USLANER, E. M. (1971) How American Foreign Policy Is Made. New York: Holt, Rinehart & Winston/Praeger.

SPANIER, J. W. (1978) Games Nations Play. New York: Praeger Publishers.

_____ (1969) American Foreign Policy Since World War II. New York: Praeger.

STEVENS, M. (1980) "No MX or pro MX." Christian Science Monitor (March 20).

STOESINGER, J. G. (1979) Crusaders and Pragmatists, Moves of Modern American Foreign Policy. New York: W. W. Norton and Company.

STROUT, R. L. (1980) "Kissinger-Reagan huddle results in apparent foreign policy 'detente'." Christian Science Monitor (July 16).

STUKEL, COL. D. (1978) Technology and Arms Control. National Security Affairs Monograph Series 78-5.

SZULC, T. (1978) The Illusion of Peace. New York: Viking Press.

TALBOT, S. (1979) End Game, the Inside Story of SALT. New York: Harper & Row.

_____ (1978) "Facing the Russians." Time Magazine (August 14).

TATE, MAJ. GEN. G. (1980) "Strategic missiles and technology defense." Paper presented at the AIAA Global 2000 Association, May 1980, Baltimore, Maryland.

TAYLOR, GEN. M. D. (1978) "Reflections on the military establishment." In Evolution of the American Military Establishment since World War II. Ed. P. R. SHRATZ. Lexington, VA: Marshall Research Foundation.

TEMKO, N. (1981a) "Moscow in arms control shifts hints willingness over weapons verification." Christian Science Monitor (July 19).

_____ (1981b) "US turns thumbs down on 'backchannel' diplomacy with Soviets." Christian Science Monitor (July 19).

THORNDIKE, T. (1979) "The evolutionary approach: the Marxist perspective." In Approaches and Theory in International Relations. Ed. T. TAYLOR. New York: Longman.

ULSAMER, E. (1980) "Changing TRIAD vulnerabilities." Air Force Magazine (June).

_____ (1979) "Counterveiling strategy." Air Force Magazine (April).

VAN CLEAVE, W. R., and THOMPSON, W. S. (1979) Strategic Options for the Early Eighties--What Can Be Done? White Plains, NY: Automated Graphic Systems, Inc.

VESTAL, B. (1974) Jerry Ford Up Close. New York: Berkley Publishing Co.

WALDHEIM, K. (n.d.) The great armaments bazaar: a global perspective." In Arms Control.

WALL, W. C. (1978) "An analysis of management control in a large-scale endeavor: the SAFEGUARD ballistic missile defense systems program." Ph.D. dissertation, University of Oklahoma.

WARNKE, P. C. (n.d.) "SALT II: what it does, what it means." Arms Control.

WEINBERGER, C. (Secretary of Defense) (1981) "MX 'vulnerability'." Aviation Week and Space Technology (May 11).

WIENER, F., and LEWIS, W. J. (1977) The Warsaw Pact Armies. Vienna, Austria: Carl Veberreuter.

WILDAVSKY, A. (1979) Speaking the Truth to Power the Art and Craft of Policy Analysis. Boston: Little, Brown and Company.

_____ (1976) "The two presidencies." In Annual Editions Readings in American Government 75-76. Guilford: The Duskin Publishing Group, Inc.

WILENSKI, H. L. (1967) Organization Intelligence. New York: Basic Books, Inc.

WILLIS, D. K. (1980) "Percy trip to Moscow." Christian Science Monitor (November 28).

WILLRICH, M. (1974) SALT--The Moscow agreements and beyond. New York: Free Press.

WINNACKER, R. A. (1978) "Secretaries of Defense." In Evolution of the American Military Establishment since World War II. Lexington, VA: Marshall Research Foundation.

WOLFE, T. W. (1979) The SALT Experience. Cambridge: Ballinger Publishing Co.

WORLD ARMAMENTS AND DISARMAMENT YEARBOOK (1976, 1977, 1978) London: Taylor and Francis, Ltd.

YANARELLA, E. J. (1977) The Missile Defense Controversy. Lexington: University of Kentucky Press.

YARMOLINSKY, A. (1971) The Military Establishment. New York: Harper Eolophon Books.

YORK, H. (1970) Race to Oblivion. New York: Simon and Schuster.

YOST, C. W. "Strategic delusions." Christian Science Monitor (August 22).

Government Documents

U.S. ARMS CONTROL AND DISARMAMENT AGENCY (1970) Arms Control 1978. Publication no. 102 (May)

U.S. CONGRESS. HOUSE. COMMITTEE ON ARMED SERVICES (1980) Department of Defense Authorization for Appropriations for Fiscal Year 1981. Hearings before the Senate Committee on Armed Services on S2294. 96th Cong, 2d sess.

U.S. CONGRESS. HOUSE. SUBCOMMITTEE ON FOREIGN AFFAIRS (1974) Arms Control and Disarmament Agency (September and October).

U.S. CONGRESS. JOINT COMMITTEE ON FOREIGN AFFAIRS AND FOREIGN RELATIONS (1981) Fiscal Year 1982 Arms Control Impact Statements. Statements submitted to the Congress by the president pursuant to section 36 of the ARMS Control and Disarmament Act. Washington, DC: Government Printing Office (February).

U.S. CONGRESS. OFFICE OF TECHNOLOGY ASSESSMENT (1981) MX Missile Basing. Washington, DC: Government Printing Office. OTA-ISC-140 (September).

U.S. CONGRESS. REPORT OF SECRETARY OF DEFENSE HAROLD BROWN (1980) FY 1981 Budget, FY 1982 Authorization Request and FY 1981-1985 Defense Programs. Washington, DC: Government Printing Office (January 29).

U.S. CONGRESS. SENATE. COMMITTEE ON ARMED SERVICES (1980) Department of Defense Authorization for Appropriations for Fiscal Year 1981. Hearings before the Senate Committee on Armed Services on S.2294. 96th Cong, 2d sess.

U.S. CONGRESS. SENATE. COMMITEE ON ARMED SERVICES (1979) Military Implications of the SALT Treaty. Pt. 1-5 (July-September).

U.S. DEPARTMENT OF THE AIR FORCE (1980) Deployment Area Selection and Land Withdrawal/Acquisition DEIS. Vol. I: Program Overview; Vol. II: Comparative Analysis of Alternatives; Vol. III: Affected Environment; Vol. IV: Environmental Consequences to the Study Region and Operating Base Vicinities; Vol. V: Appendices. Norton Air Force Base: Ballistic Missile Office (December).

U.S. DEPARTMENT OF THE AIR FORCE (1978) Final Environment Impact Process MX: Milestone 11. Vol. I: Program Overview; Vol. III: Missile Flight Testing; Vol. IV: Basing Mode Evaluation; Vol. V: Appendices; Vol. VI: Public Comments. Norton Air Force Base: ICBM Program Office (October).

U.S. DEPARTMENT OF DEFENSE (1979) Report of Secretary of Defense to Congress on the FY 1980 Budget (January 25).

U.S. DEPARTMENT OF DEFENSE. OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE (1980) ICBM Basing Options (December).

U.S. DEPARTMENT OF STATE (1979 SALT II Agreement. Selected Documents no. 12A (June 18).

U.S. DEPARTMENT OF STATE (1979) Compliance with SALT I Agreements. Special Report no. 55 (July).

Interviews

ATWATER, LEE. Deputy Assistant to President Reagan for Political Affairs, White House. Washington, DC.

COLLINS, JOHN. Library of Congress.

MX EDUCATION BUREAU. Rosslyn, VA.

MX INFORMATION CENTER. Salt Lake City, Utah.

SMITH, GERARD. Chief SALT I Negotiator.

TALBOT, STROBE. Time Magazine, Washington, DC.

TAYLOR, JACK. Daily Oklahoman, Oklahoma City, OK.

TSIPIS, KOSTA. Massachusetts Institute of Technology, Cambridge, MA.

UTAH MX COORDINATION OFFICE. Salt Lake City, Utah.

WHITE, EASTON. Industrial College of the Armed Forces.

Newspapers

DAILY OKLAHOMAN (Oklahoma City, OK) August-October 1980.

DESERT NEWS (Salt Lake City, UT) October 28, 1978; and September 14-15, 1981.

SUN (Las Vegas, NV) February-June 1981.

TIMES (Huntsville, AL) 1979-1981.

NEW YORK TIMES (New York City).

APPENDIX 1

SUMMARY OF MAJOR PROVISIONS

OF ARMS CONTROL AGREEMENTS

Antartic--Internationalizes and demilitarizes the Antartic continent.

Hot Line Agreement--Provides direct communication between heads of government to reduce danger of accidental war, miscalculation, or surprise attack which might trigger a nuclear war.

Limited Test Ban--Prohibits nuclear weapons tests or explosions in the atmosphere, in outer space, and under water.

Outer Space--Governs activities of nation states in the exploration and use of outer space, including the moon and other celestial bodies.

Prohibit Nuclear Weapons in South America--Limits spread of nuclear weapons by preventing their introduction into areas hitherto free of them.

Nuclear Non-Proliferation--Prohibits diversion of nuclear materials from peaceful purposes by an international system of safeguards.

Seabed Arms Control--Prohibits placement of nuclear weapons or other weapons of mass destruction of the seabed.

Improved Hotline--Improves communications links of previous agreement.

Nuclear Accidents--Provides for improvement and maintenance of technical safeguards against accidental launch, immediate notification of accidental launch, and advance notification of launches beyond territory of launching party.

Biological Weapons Convention--Prohibits development, production, and stockpiling of bacteriological and toxin weapons and provides for their destruction.

ABM--Places limitations on antiballistic missile systems.

Interim Agreement on Offensive Strategic Arms--A holding action to complement the ABM by limiting competition in offensive arms.

Standing Consultative Commission--Provides for discussion of treaty violations or any subject pertaining to strategic arms limitation.

Basic Principles of Negotiations on Further Limitation of Strategic Offensive Arms--Establishes ground rules for initiation of SALT II negotiations.

Threshold Test Ban Treaty with Protocol--Prohibits testing of underground nuclear weapons having a yield exceeding 150 kilotons of TNT.

Protocol to the ABM--Permits each side to reserve its decision relative to the original choice of ABM sites.

Limitation of Underground Explosions for Peaceful Purposes--Governs underground nuclear explosions carried out at locations outside specified weapons test site contained in the Threshold Test Ban Treaty.

Environmental Modification Convention--Prohibits military or any other hostile use of environmental modification techniques.

SALT II--Provides for limitations of certain strategic offensive weapons systems.

APPENDIX 2

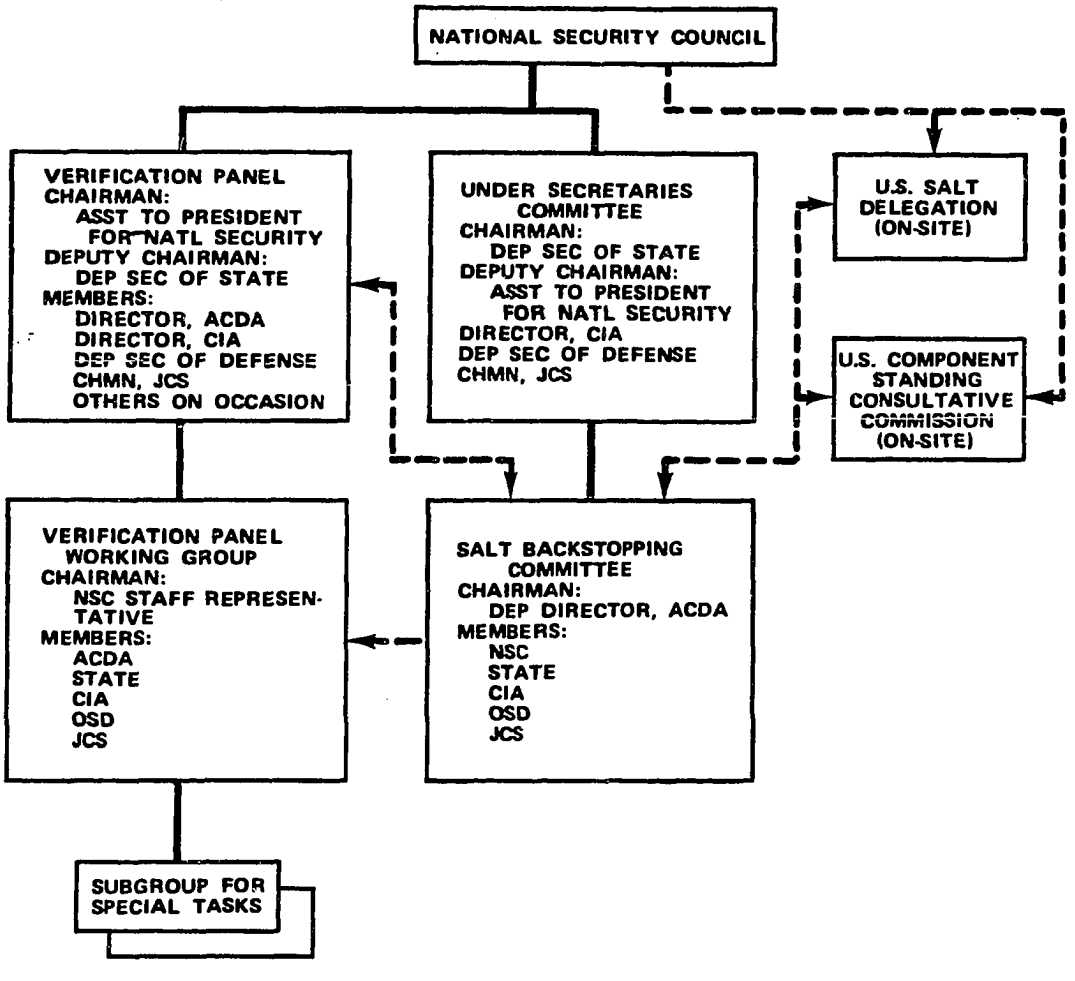
ORGANIZATION FOR SALT

The organization put together by Nixon was shaped so that it was fully responsive to the centralized White House direction within the National Security Council (NSC) system. The organizations primarily involved in the SALT process NSC system were the ACDA, Department of Defense (DOD), Joint Chiefs of Staff (JCS), and the Department of State. Figure 2-1 depicts the organization chart which reflects the working relationships established by President Nixon. The organization under the National Security Council were established as a result of National Security Study 28 (Newhouse, 1973: 162) (see figure 2-2).

NATIONAL SECURITY COUNCIL

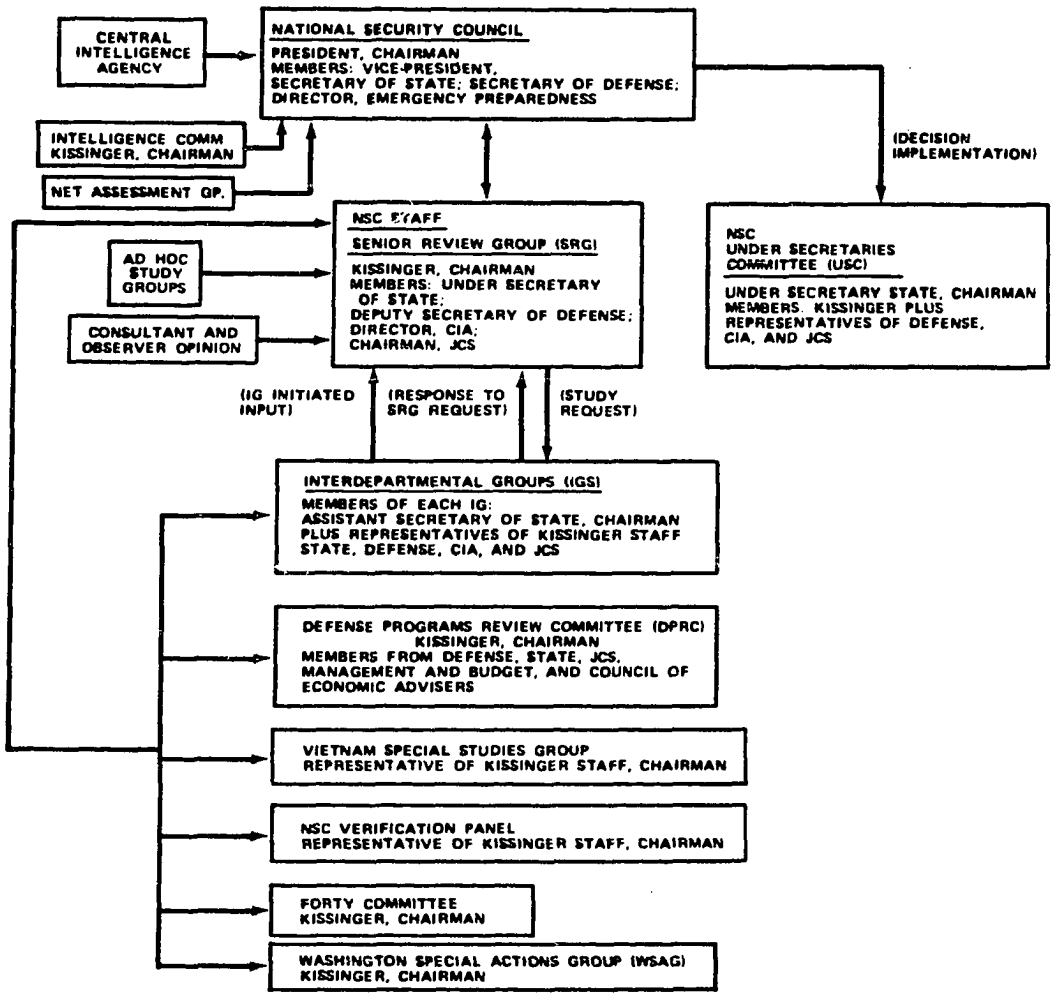
On January 20, 1969, the reorganization of the NSC was started and was necessary since Nixon intended to block the bureaucracy's tendency to dilute his options by presenting firm positions on foreign policy issues. Kissinger established six new functions within the NSC and set himself up as chairman of five of them (Platt, 1978: 10-11; also see Cronin, 1979: 239). The need for cooperation and consensus

FIGURE 2-1
NIXON ORGANIZATION FOR SALT



SOURCE: WOLFE, THE SALT EXPERIENCE, BALLINGER: CAMBRIDGE, 1979, P. 30.

FIGURE 2-2
THE NATIONAL SECURITY COUNCIL SYSTEM



SOURCE: DR. RUFUS HALL, UNIVERSITY OF OKLAHOMA LECTURE HANDOUT,FEBRUARY,1980.

remained, but Nixon and Kissinger intended to acquire concurrence through other than traditional means.

VERIFICATION PANEL

The Verification Panel was established in July 1969 by suggestion of Kissinger, with himself as its chairman. The primary function of the panel was to review all strategic, political, and verification implications of SALT. It was comprised of Kissinger, ACDA Director Smith, Secretary of State Richardson, Secretary of Defense Laird, Chairman of the JCS, CIA Director, and the U.S. Attorney General Mitchell (Wolfe, 1979: 26-29). Creation of the Verification Panel did several things relative to the shaping of the SALT process. It moved the center of SALT planning from the ACDA to the White House. It served as a pacifier to the JCS, who had been concerned about the verification process. It provided a structured concept for soliciting analytical work on SALT policy alternatives from the National Security Bureaucracy, while giving the relevant agencies access to the analytical process, even if not to the ultimate decision process (Platt, 1978: 10-11). The new panel further indicated that political direction and decisions would be made from the top down, eliminating the lengthy bureaucratic process. Kissinger's public statement regarding establishment of this panel was that it virtually eliminated the narrow adversary approach that had previously dominated the SALT process (Platt, 1973: 10). What it did not say was the formulation of this working

group was the first step completed by Kissinger to dominate the strategic arms limitation process.

VERIFICATION PANEL WORKING GROUP

This working group was the support group to the Verification Panel that was also chaired by Henry Kissinger. It was comprised of, or at least had access to, hundreds of specialists from within the DOD organization. The work group produced exhaustive studies on the SALT options and possible negotiation positions. The group produced nine options that could be used by the negotiating team on the premise that it left the negotiating options open, and the front team would not have to return to Washington for instructions so frequently. William Van Cleave, a negotiating team member, described the Verification Panel decision process as follows. "Dr. Kissinger and his staff decided the work to be done, the issues to be addressed, the agendas of inter-agency meetings and usually the wording of directives. . ." (Platt, 1978: 11; also see Newhouse, 1973: 162).

THE UNDER SECRETARIES COMMITTEE

This committee, chaired by the deputy secretary of state, had membership paralleled by that of the Verification Panel, and consequently it never got particularly active in the SALT process. The function that it did serve to some degree was to monitor the United States' compliance with the negotiated SALT I treaty.

THE SALT BACK STOPPING COMMITTEE

This committee functioned as the direct support group to the U.S. SALT delegation. It was chaired by the deputy director of ACDA, and was composed of representatives of the Verification Panel. Primarily, it directed requests to and from the negotiating team to the proper organization for staffing. Critical issues, such as decisions on deadlocked negotiating points, were directed to the Verification Panel (Platt, 1978: 30).

THE SALT DELEGATION (ON SITE)

The SALT delegation was the on site negotiator for Salt I. The principals were: Gerard Smith, chief negotiator; Phillip Farley, alternate chairman; Ambassador Llewellyn Thompson; Harold Brown; Paul Nitze; and General Royall Allison. According to Gerard Smith (1980: 39) these individuals were all seasoned arms control men who had been involved in the pre-negotiation efforts during the Johnson administration. Smith further states that he doubts if the Nixon people were aware of how deeply the principals were involved during the previous administration.

Each one of these people was picked because of a special attribute or background. Smith (1980: 14) had worked in the arms control arena under Presidents Truman, Eisenhower, Kennedy, and Johnson. During this time he had developed good working relationships with the major departments involved in national security and had been appointed ACDA Director.

The appointment of an ACDA Director was a controversial matter. Many of the military people had the idea that Smith would be a dis-armer rather than a controller. Newhouse (1973: 43) writes that Smith was a competent negotiator with a good grasp of the issues but to direct both ACDA and SALT is a compromise in the event that ACDA had differing views from the White House on some issue. When these views clashed, Smith knew that the White House would prevail (see Kissinger, 1979: 539). The Hon. John J. McCloy stated in the hearings before the House of Representatives (p. 10) that the ACDA should not always be the chief negotiator due to the requirement of being away from his duty station for extended periods. An interesting point in Smith's behalf is that he was the only member of the negotiation contingency that spoke the Russian language.

Smith (1980: 38-44) writes that Farley was chosen because he was the Deputy ACDA Director; Thompson because of his expertise in Soviet relations; Brown for his knowledge of science and technology, international politics, and management experience; Nitze because of his experience in national security affairs; and General Allison due to experience in long range strategic planning and politico-military affairs. These principals were supported by a contingency that ranged from twenty-five to one hundred people on site (Wolfe, 1979: 33.

U.S. COMPONENT STANDING CONSULTATIVE COMMISSION

The Standing Consultative Commission (SCC) was not part of the decision-making process and may be considered a result of SALT I. Its function was to consider questions of compliance with obligations of the SALT Treaty. It was officially constituted in December 1972, and was made up of equal numbers of U.S. and Soviet delegates. Beginning in May 1973, its function was separated from the SALT negotiating process (Rhinelander, 1974: 153-54).

The meetings of this commission are classified secret and their minutes are not published. Either side can raise any question that it sees fit relative to compliance or to interference with the national technical means. Rhinelander writes that the most important function of the commission would be the agreement relevant to when missile systems must be dismantled in accordance with negotiated treaties (1974: 153-54).

CONGRESSIONAL INVOLVEMENT

Congressional involvement is best viewed from an overview, since there were countless incursions, conflicts, and controversies during the formative period of SALT covered by this paper. The Senate did not play a very meaningful role in the formulation of foreign policy during the period of November 1969 to 1972. The Senate, as an institution, and very few Senators, as individuals, expressed much more

than lip service in keeping informed on current status of SALT. They did not request details, question or debate the policy goals, or attempt to offer any alternatives to those that were presented (Platt, 1978: 30).

The Administration initiated action in May 1972 to ensure ratification of SALT I by increasing contacts with Congress through presentations. It agreed to link the Treaty to a modernization program on offensive weapons systems to appease conservatives in Congress, and to satisfy the primary gadfly of the period, Senator Henry Jackson, by attaching his Interim Offensive Weapons Agreement (Platt, 1978: 31).

Congressional activity during the 1972-1974 period was very similar to that of the prior three-year period. Senators Case, Cranston, Humphrey, Jackson, Kennedy, Mathias, Mondale, and Muskie were the primary individual actors of the time. The overall attitude toward foreign policy formulation in this period seems to bear out the philosophy that it is the realm and primary responsibility of the president. Congressional activity did become more active beginning in 1972 with the ratification of SALT I.

Kissinger in the period 1969 to 1973 was not required to brief Congress due to his executive privilege status. Briefings given to Congress were one sided (Platt, 1978: 45). Kissinger had pursued the necessary congressional members and committee heads to insure his confirmation as secretary of state in 1973. Platt (1978: 46-48) writes that Congress

thought the days of executive privilege were over and after being assued that a new era of cooperation, between the strategic arms limitation process and Kissinger, would be forthcoming were surprised at the first briefing. When Kissinger was asked for SALT II specifics, his response was words to the effect that not much is new, not much progress has been made, but expressed hope for great success in the next meetings.

STATE DEPARTMENT

In the case of the Nixon administration, the department did not play a significant role in the arms control process because of his inherent distrust of the department. Nixon selected Rogers as his Secretary of State knowing that Kissinger would be the dominant one in the relationship which met his requirement for handling foreign policy from the White House.

It is significant to reiterate the fact that ACDA is an element of the Department of State and the point that Kissinger was made Secretary of State in 1973. At this point in the SALT process, the congressional intent was to confirm Kissinger as Secretary of State, which would remove his executive privilege when testifying before Congress in order that they might be more informed. Nixon had placed Kissinger in the position that now gave the president almost complete control of SALT. He had placed Kissinger on the NSC, Kissinger had made himself chairman of all NSC

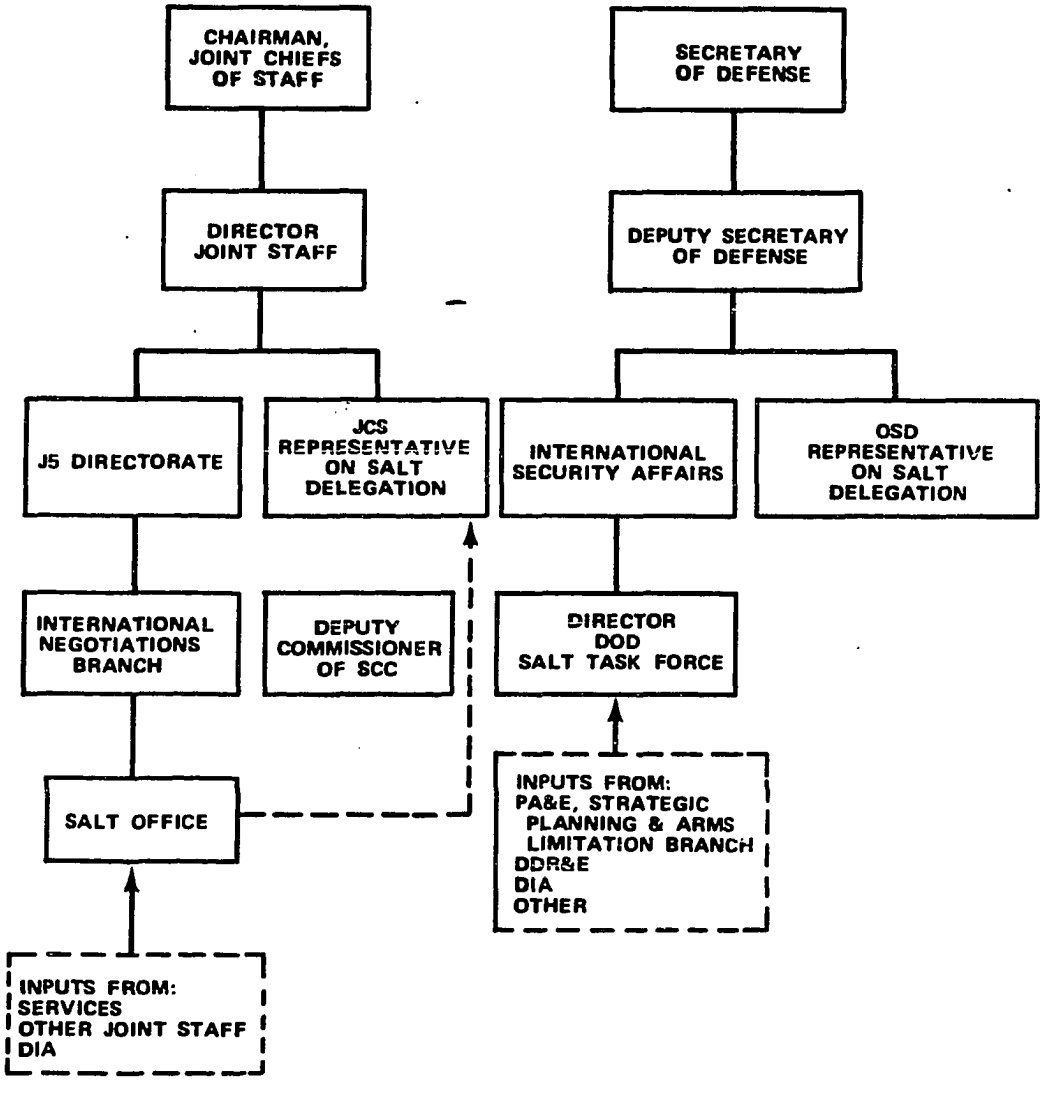
subcommittees, and he was now Secretary of State, which automatically placed the ACDA under Kissinger's direction. The complete domination of the National Security Council is illustrated in figure 2-2. This illustration has been included to delineate the number of areas chaired by Kissinger.

MILITARY SALT GROUPS

The DOD was represented by two groups, one chaired by the Chairman, JCS, and the other by the Office of Secretary of Defense (OSD). See figure 2-3. These two organizations remained virtually intact during the 1968-1974 period. The JCS, in keeping with their statutory role, retained a relatively independent voice throughout the SALT arena. There was not always a solid front presented from the Pentagon side. They were at odds many times with OSD, reflecting the mood of the current Secretary of Defense (Wolfe, 1978: 40-43).

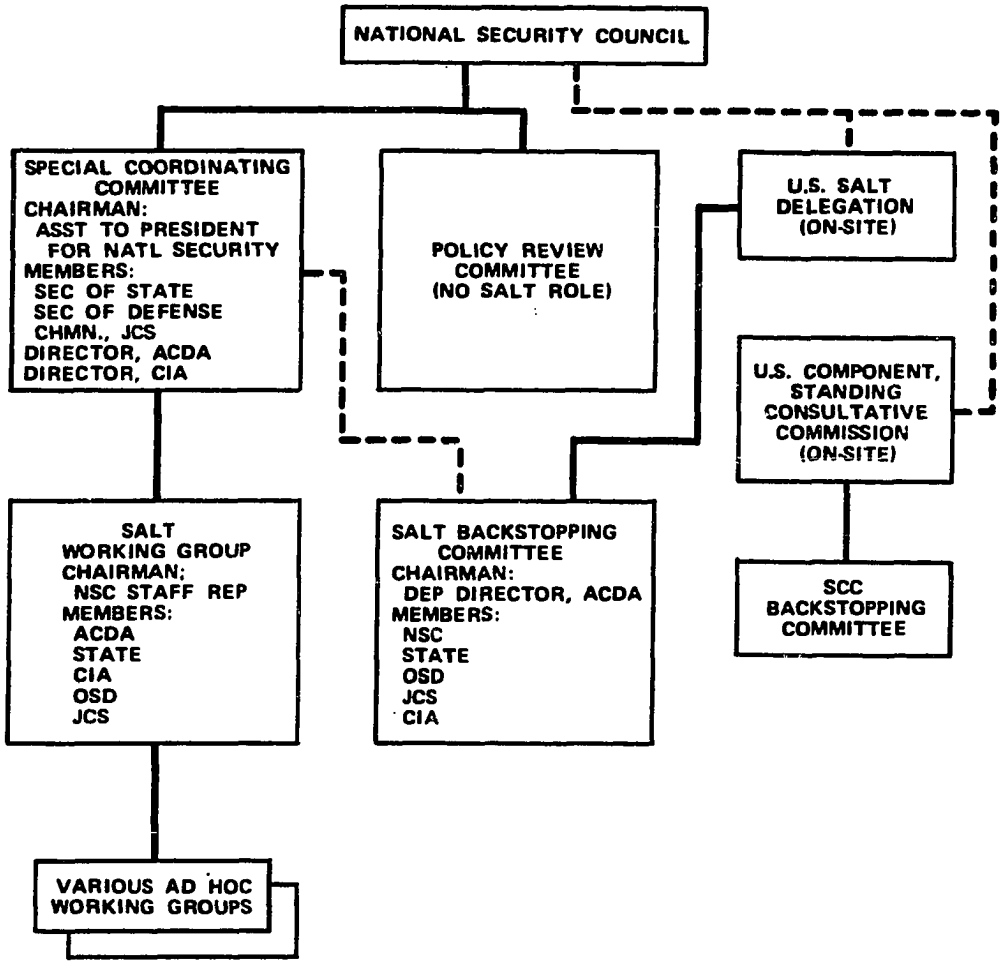
The National Security Council structure utilized by the Carter administration is shown in figure 2-4. The major change is that he abolished the Verification Panel and replaced it with a similar group called the Special Coordinating Committee.

FIGURE 2-3
U.S. MILITARY ORGANIZATION FOR SALT



SOURCE: WOLFE, THE SALT EXPERIENCE, BALLINGER: CAMBRIDGE, 1979, P. 41.

FIGURE 2-4
CARTER ORGANIZATION FOR SALT



SOURCE: WOLFE, THE SALT EXPERIENCE, BALLINGER: CAMBRIDGE, 1979, P. 37.

APPENDIX 3

SALT I TREATY SUMMARY

The SALT I negotiations lasted for two and a half years, with seven rounds of meetings, each lasting four to seven months. The rounds involved a total of one hundred sessions between the delegates. The location of the seven rounds alternated between Helsinki and Vienna, with meeting sites alternating between the American and Soviet embassies (Nash, 1973: 167). See table 3-1.

SALT I produced four agreements. Two of these, the ABM Treaty and the Interim Offensive Strategic Weapons Agreement, deal with arms control. The other two are executive type agreements that were entered into without congressional debate or ratification. These were the Accident Measures and the revised Hot Line Agreements.

The ABM Treaty

The ABM Treaty was ratified by a Senate vote of 88-2. Prior to 1972, Congress had played a minimal role in the SALT process. After May 1972, it became directly involved through its formal role in ratifying any treaties produced as a result of negotiations by the Executive Branch and through the provisions of the Arms Control and Disarmament

TABLE 3-1
SALT I NEGOTIATION SESSIONS

SALT I: NOVEMBER 1969–MAY 1972

SALT SESSION	SUMMIT	OTHER MEETING	CHIEF PARTICIPANTS	DATES
1. HELSINKI			DELEGATIONS	NOV–DEC 1969
2. VIENNA			DELEGATIONS	APR–AUG 1970
3. HELSINKI			DELEGATIONS	NOV–DEC 1970
		WASHINGTON	KISSINGER/DOBRYNIN	JAN 1971
4. VIENNA			DELEGATIONS	MAR–MAY 1971
5. HELSINKI			DELEGATIONS	JUL–SEP 1971
6. VIENNA			DELEGATIONS	NOV 71–FEB 72
7. HELSINKI			DELEGATIONS	MAR–MAY 1972
		MOSCOW	KISSINGER/BREZHNEV	APR 1972
	MOSCOW		NIXON/BREZHNEV	MAY 1972

SOURCE: WOLFE, THE SALT EXPERIENCE, BALLINGER: CAMBRIDGE, 1979, P. 277.

Act of 1961, calling for congressional cognizance of arms control understandings. The ratified treaty was of unlimited duration and stipulated that the U.S. and the U.S.S.R. were both limited to two ABM complexes, one for the nation's capitals of Washington and Moscow, and the second to protect one field of intercontinental ballistics missiles. Each site would be limited to 100 ABMs, or a total of 200 ABMs for each country. The U.S. protection site was determined to be Grand Forks, North Dakota, while the Soviet site, unidentified, would be at least 800 miles from Moscow. This separation was to match the U.S. separation pattern and it would preclude the Soviets from utilizing the two allowed sites in conjunction to protect two-thirds of their population and industry that was concentrated in European Russia (Nash, 1973: 173).

At the time of ratification, the U.S. had started construction on two sites, the Grand Forks site and Malstrom Air Force Base in Montana. The capital site construction had not started. The Soviets had almost completed their capital site, but had not started the distant site. Malstrom dismantling and destruction started in October 1972. A July 1974 Protocol Document to the ABM Treaty reduced the ABM site limits to one for each country. Russia obviously selected the capital site, and the U.S. kept the Grand Forks installation which was subsequently turned into a radar test and listening post.

The Interim Offensive Strategic Weapons Agreement was an executive agreement that did not require a two-thirds

Senate approval, although it was required to have a majority of congressional support in accordance with the establishment of ACDA in 1961. It was passed by an 88-2 vote. The Agreement, with an expiration date of 1977, limited all ICBMs to those under construction or deployed at the time. The U.S.S.R. was permitted to retain 1,618 operational ICBMs including a total of 313 heavy (SS-9) missiles to the U.S. total of 1,054 including 54 Titan missiles. SLBMs were frozen to the 1972 levels allowing the U.S.S.R. to have 62 nuclear powered submarines containing 710 launchers (Russett, 1978: 28-32).

These two agreements did not place qualitative improvement restrictions; thus, each nation could proceed with any improvements, including MIRV and technological changes, that it saw fit. To improve and increase offensive strengths, each nation could continue to produce more powerful ICBMs to put in existing silos.

Each nation could discontinue the treaty with a six-month prior notification if it felt that its national security was threatened. Open on-site inspection was not permitted, but each nation was allowed to verify compliance without intentional interference by the other country.

The Accident Measures, or the "agreement on measures to reduce the risk of outbreak of nuclear war," consisted of three pledges. These were:

1. To take measures that each county considers necessary to safeguard against accidental or unauthorized use of nuclear weapons.

2. To notify each other immediately should a risk of nuclear war arise from detection by early warning systems of unidentified objects or from accidental, unauthorized, or other unexplained incidents involving a possible detonation of a nuclear weapon.

3. To give advance notice of planned missile launches beyond the territory of the launching party and in the direction of the other party.

The Hot Line Agreement was an extension of the 1963 agreement which established a wire telegraph circuit routed from Washington-London-Copenhagen-Stockholm-Helsinki-Moscow. The 1971 agreement provided for establishment of a satellite communication link between Moscow and Washington.

SALT I Negotiation Tradeoffs

The negotiation process must contain an element of compromise and the granting of concessions. The U.S. concessions (Russett, 1978: 32) have been depicted as follows:

1. Accepted a Soviet numerical superiority in landbased ICBM launchers.

2. Agreed to postpone a discussion of MIRV.

3. Agreed not to include the U.S.S.R.'s IRBMs.

The Soviet concessions were:

1. Agreed not to discuss any U.S. tactical offensive units located near the U.S.S.R.

2. Agreed to impose a numerical ceiling on the SS-9 (heavy missiles).

3. Agreed to shift from concentrating exclusively on defensive weapons to a discussion of defensive and offensive weapons.

4. Accepted, under certain conditions, a ceiling on submarine based missile launchers.

5. Agreed not to limit strategic bombers (B52s) in initial discussions.

SALT I Assessment

The first phase of SALT was concluded on May 26, 1972, when President Nixon and General Brezhnev signed the ABM Treaty and the Interim Agreement. The treaty preamble stated each side's intention to end the nuclear arms race at the earliest possible date, and to reduce strategic arms. While the talks were in progress, the U.S. added about 2,000 nuclear warheads and the U.S.S.R. added approximately 1,000 to their respective arsenals (Wolfe, 1979: 94-113).

From a political perspective, even though the U.S. and U.S.S.R. are political, military, and ideological adversaries, the spirit of detente had been invoked through the SALT process. While most of the more controversial subjects had been deferred, both sides had recognized the inherent dangers of nuclear war.

U.S. Assessment

Some opinions, both congressional and public, were that the U.S. had come away with having given up too much in quantitative numbers to the Soviets to compensate for the U.S. advantages in technological capability and geographic asymmetries. The agreements did not promise to eliminate Soviet-American strategic competition, but they did entail a considerable political investment by both sides, creating

what might have been called a "SALT imperative"--the requirement for both sides to avoid steps or actions that would derail further negotiations. The political investment by the U.S. is considered to be greater than the U.S.S.R., because ratification of SALT I verified or put a stamp of validation on the U.S.S.R. as an equal superpower. The Treaty had also given up the capability to defend the ICBM line of defense. Senator Jackson said that "the present agreement is likely to lead to a technological arms race, with great uncertainties, profound instability, and considerable costs." Henry Kissinger countered this criticism by pointing out that the U.S. had maintained superiority in numbers of strategic bombers. President Nixon said, "Phase 1 is the breakthrough and Phase 2 is the culmination" (Nixon, 1978: 81).

APPENDIX 4

SALT II TREATY SUMMARY

The SALT II negotiations initiated in 1972 lasted approximately six and one half years. See table 4-1 for meetings that occurred. During the negotiation period, both participants continued to modernize and increase nuclear weapons stockpiles. The base line finally presented for verification purposes is shown on page 80. The U.S. inventory grew to over 9,000 warheads and the U.S.S.R. acquired in excess of 4,000. Of the U.S. weapons, 3,600 have one-megaton warhead capability, which represents ten times the power required to destroy the major cities of the Soviet Union. Secretary of Defense Brown, in his fiscal year 1979 report, stated that the U.S. must have the capability to destroy a minimum of 200 Soviet cities which contain 34 percent of the population and 62 percent of its industrial capacity. (Wolfe, 1979: 94-113). It is expected that the Soviets could accomplish the same destruction to the United States.

SALT II Interim Period

There were three sets of issues remaining or carried over from SALT I that had to be cleared prior to

TABLE 4-1
SALT II NEGOTIATION SESSIONS

SALT II: SEPTEMBER 1972–JANUARY 1979

SALT SESSION	SUMMIT	OTHER MEETING	CHIEF PARTICIPANTS	DATES
		MOSCOW	KISSINGER/BREZHNEV/GROMYKO	SEP 1972
1. GENEVA			DELEGATIONS	NOV–DEC 1972
2. GENEVA			DELEGATIONS	MAR–APR 1973
3. GENEVA			DELEGATIONS	MAY–JUN 1973
		MOSCOW	KISSINGER/BREZHNEV/GROMYKO	MAY 1973
	WASHINGTON		NIXON/BREZHNEV	JUN 1973
4. GENEVA			DELEGATIONS	SEP–NOV 1973
5. GENEVA			DELEGATIONS	FEB–APR 1974
		WASHINGTON	NIXON/KISSINGER/GROMYKO	FEB 1974
		MOSCOW	KISSINGER/BREZHNEV/GROMYKO	MAR 1974
		WASHINGTON	NIXON/KISSINGER/GROMYKO	APR 1974
		GENEVA	KISSINGER/GROMYKO	APR 1974
	MOSCOW		NIXON/BREZHNEV	JUN–JUL 1974
6. GENEVA			DELEGATIONS	SEP–NOV 1974
		WASHINGTON	FORD/KISSINGER/GROMYKO	SEP 1974
		MOSCOW	KISSINGER/BREZHNEW/GROMYKO	OCT 1974
	VLADIVOSTOK		FORD/BREZHNEV	NOV 1974
7. GENEVA			DELEGATIONS	JAN–MAY 1975
		GENEVA	KISSINGER/GROMYKO	FEB 1975
		VIENNA	KISSINGER/GROMYKO	MAY 1975
8. GENEVA			DELEGATIONS	JUL–NOV 1975
		GENEVA	KISSINGER/GROMYKO	JUL 1975
	HELSINKI		FORD/BREZHNEV	JUL–AUG 1975
		WASHINGTON	FORD/KISSINGER/GROMYKO	SEP 1975
9. GENEVA			DELEGATIONS	DEC 1975
10. GENEVA			DELEGATIONS	JAN–MAY 1976
		MOSCOW	KISSINGER/BREZHNEV/GROMYKO	JAN 1976
11. GENEVA			DELEGATIONS	JUN–JUL 1976
12. GENEVA			DELEGATIONS	SEP–NOV 1976
		NEW YORK	KISSINGER/GROMYKO	SEP 1976
		WASHINGTON	FORD/GROMYKO	OCT 1976
		MOSCOW	VANCE/BREZHNEV/GROMYKO	MAR 1977
13. GENEVA			DELEGATIONS	MAY–DEC 1977
		GENEVA	VANCE/GROMYKO	MAY 1977
		WASHINGTON	CARTER/VANCE/GROMYKO	SEP 1977
14. GENEVA			DELEGATIONS	JAN 1978
		MOSCOW	VANCE/BREZHNEV/GROMYKO	APR 1978
		WASHINGTON	CARTER/VANCE/GROMYKO	MAY 1978
		NEW YORK	VANCE/GROMYKO	JUNE 1978
		GENEVA	VANCE/GROMYKO	JUL 1978
		MOSCOW	WARNKE/GROMYKO	SEP 1978
		NEW YORK	VANCE/GROMYKO	SEP 1978
		WASHINGTON	CARTER/VANCE/GROMYKO	SEP–OCT 1978
		MOSCOW	VANCE/BREZHNEV/GROMYKO	OCT 1978
		GENEVA	VANCE/GROMYKO	DEC 1978

SOURCE: WOLFE, THE SALT EXPERIENCE, BALLINGER: CAMBRIDGE, 1979, PP. 277-278.

initiation of the primary issues in SALT II (Wolfe, 1979: 94-113). These were:

1. How to convert the Interim Agreement, which was to expire in October 1977, into a comprehensive agreement that would satisfy the Soviet requirement of "equal security and no unilateral advantage" and the U.S. requirement for "essential equivalence."

2. How to apply qualitative and quantitative controls to MIRV systems on an equitable basis.

3. What provisions to adopt with regard to nuclear-capable U.S. forward-based systems (FBS) which were intended for NATO defense but considered by the U.S.S.R. to be a strategic threat to their homeland.

The problem of converting the Interim Agreement was not resolved since there seemed to be no common point of departure for negotiation. The back channel and summitry could not solve the issue, and in July 1974 it was dropped with a weak resolution that it would be considered again under a set of provisional limitations running from 1977 to 1985. It is to be noted that it was extended in 1977 to last at least until SALT II is dispositioned by the U.S. government.

The MIRV issue had been previously set aside, partly because the Soviets had not completed development and testing of the technology. The U.S. offered to limit planned MIRV deployment, tied to an approximate equality in throw-weight in deployed MIRVs, while at the same time proposing no payload restrictions on missiles without MIRV. This was rejected and countered by a proposal to limit MIRVs by

numbers, not throw-weight, which was rejected by the U.S. After a series of offer-counter-offers, Kissinger stated that it might be solved if Brezhnev and his colleagues took matters of strategic policy into their own hands (removing the issue from Soviet military affairs to a political decision). The solution will be discussed later in the Vladivostok meeting.

The FBS issue was critical to the U.S. because it involved the credibility of standing commitments to NATO defense. It was equally important politically to the Soviets because of its aim to keep the NATO alliance fragmented and strategically important from the aspect of keeping limited potential damage to the Soviet Union in case of war from the NATO source. This issue also was resolved at the Vladivostok conference.

There were other areas of divergence in the strategic philosophic approaches. The U.S. concept of deterrence--the capability to survive an incoming attack and still have the capability to annihilate the attacker with the knowledge that the other side could do the same thing--was not acceptable to the U.S.S.R. They were of the opinion that deterrence was a desirable characteristic, but could not hold on to the mutually assured destruction concept that it annotated. The U.S. concept implied that a nuclear war was unwinnable, and the Soviet strategy was that it could be won.

The Vladivostok Summit

This summit meeting took place on November 24, 1974 with the arrangements being made through back channel means. The participants of this summit were President Ford, Secretary of State Kissinger, Secretary Brezhnev, and Foreign Minister Gromyko. After two days of negotiations, a declaration of intent stating what the feature of SALT II would resemble was made. It would require more than four additional years to complete this negotiation. The essential features (Wolfe, 1979: 212-17) of the proposed accord were:

1. Establishment of an overall ceiling of 2,400 strategic delivery vehicles, including ICBMs, SLBMs, and bombers.

2. An equal number of MIRVed launchers for each side, with any missile tested with MIRV to be counted as having MIRV capability.

3. Freedom to mix and match within the 2,400 limit.

4. A sublimit of 313 heavy missiles with no new silo construction.

5. Deployment of land-mobile missiles and some types of bomber-launched missiles, but numbers to be included in the overall limit.

6. No constraint on modernization that would preclude improvements in accuracy of deployment of new systems.

7. The new agreement would be in effect until 1985, with the SALT I Interim Agreement being in effect until 1977.

8. Following conclusion of the new agreement, further negotiations for possible reductions in strategic arms would begin no later than 1982.

It is to be noted that the requirement for a comprehensive offensive agreement was dropped. The forward based systems issue was also deleted. It is also interesting to note how closely these basic accords resemble the treaty signed in 1979.

These Vladivostok basic ground rules received a mixed reaction within the United States. Commentary ran the gauntlet from being too high in allowed numbers to the fact that the modernization clause left the door open for continued expenditures of large sums of money. On the positive side, the inclusion of MIRV for the first time and numbers of strategic bombers permitted were supported.

Vladivostok Implications

The Vladivostok summit had produced what was seemingly a blueprint or grid which would only require a plugging in of numbers and the preparation of boiler-plate statements. However, the FBS issue was continued from the aspect that the Soviets should be compensated through larger numbers. The issue, after a period of time, disappeared. It is suspected that a reassessment by the Soviets occurred in which two conclusions might have been reached. First, the FBS was not as great a threat as originally thought. Second, and probably the most plausible, the determination was made that they had gotten maximum mileage from the issue during negotiation, and it was not actually worth pursuit.

The Cruise Missile question was linked to the Backfire bomber when satisfactory solutions could not be reached on individual systems. The Cruise point was the question relative to whether they should be counted at all, and the U.S. position on Backfire was that it had the potential to be used as a long-range bomber. The Soviets countered the Backfire inclusion with tying it to the U.S. FB-111 fighter plane, which was not being counted.

The U.S. proposed in 1976 that the Soviets be permitted to have up to 250 Backfires, which would not be included in the totals, and that Cruise missile categories (ALCM-SLCM-GLCM) be considered individually. The Soviets countered this with an offer to reduce the total of 2,400 to 2,200 launchers, no limit on Backfires, and bombers carrying greater than 10 ACLMs be included with range limited to 1,000 miles, and all other forms not counted but limited to a maximum of 372 miles (Jones, 1979). These issues, being fairly close, were still not resolved. This was the last major proposal offered by the Ford-Kissinger era. Negotiation continued on a low profile until the Carter administration.

In March 1977, President Carter issued two counter proposals, one which followed the Vladivostok basic guide, and one which took these basic guides and further reduced the maximum allowable quantities. Neither proposal included Backfire, but banned Cruise with greater than 1,500 miles

range. The Soviets, being strategically oriented to the long range heavy ICBM technology, considered this as an effort to curtail their mainline of defense and rejected the proposal.

It is a matter of conjecture, but it is thought that the Soviets might have been reacting to the Carter style of diplomacy. He had come down hard on human rights issues and had pointed a finger directly at the Soviet Union on the subject. In addition, President Carter had made the content of the alternatives available to the American public prior to its formal presentation to the Soviet SALT team, which violated their tenet for secrecy during negotiation.

The SALT II Framework

In May 1977, Secretary Vance made an additional proposal that separated the substance of SALT II into three categories: a treaty to run through 1985, based on the major issues of the Vladivostok accords that could be agreed on; a Protocol Document to be attached to the treaty that would last for approximately three years that would contain the controversial issues such as Cruise and Backfire, mobile ICBM limitations, qualitative ICBM constraints, and limits contained in the Protocol Document would be temporary; and a Joint Statement of Principles that would establish guidelines for follow on negotation for substantial reduction in numbers.

While the proposal was generally acceptable, the Soviets could not accept the proposal in its entirety. The

U.S. proposed a 2,160 total; the Soviets wanted 2,250--the figure finally agreed to. The U.S. proposed to be down to the agreed maximums by December 1981, while the Soviets held out for a longer period. The December 1981 date was agreed to. The Backfire was agreed not to be counted, deployment of Cruise was permitted after the end of the Protocol Document, during which time the U.S. could deploy a land-based mobile ICBM. The Soviets agreed that the U.S. could continue to transfer its technology to its allies.

The SALT II Treaty

The Treaty signed on June 18, 1978, established the following quantitative sublimits:

ICBM	MIRV	820	MIRV warheads	10
SLBM	MIRV	1,200	MIRV warheads	12
Bombers with Cruise		1,320	MIRV warheads	20
Combined strategic nuclear delivery vehicles of all types		2,250		

The treaty limits both sides to building no more heavy missiles--i.e., SS-18. This impacts the Soviets because they already had 313 in inventory. The rapid reload capability technology was suspended. Mobile land-based ICBMs will not be deployed until after 1981. The Soviets agreed not to build any more SS-16s to be mated with the SS-20 to produce a heavy ICBM. Treaty duration is through 1985.

The Protocol Document expires in 1981. The U.S. agreed not to build SLBM with a range greater than 360 miles. Both sides will develop one ASBM.

Constraints to Ratification

In an address to the Committee on Foreign Relations, General David Jones (1979), chairman of the Joint Chiefs of Staff, summarized the position of the treaty supporters when he said:

> Despite differing degrees of concern on specific aspects of SALT II, all of us judge that the agreement which the President signed in Vienna is in the national interest and merits your support.

The opposition (Senator Baker) to the treaty is attacking the document content. The general consensus here is that the "as is" treaty, if implemented, will leave the U.S. in a weaker strategic position than that of the Soviets. The Russians will have more large systems and greater numbers of warheads. Part of the opposition's concern is that the war may be fought in stages, with the country having the most "shots" winning.

The opposition (Senator Glenn) also questions the capability of verification. The view on this point is that the more tightly controlled society of Russia will make adequate verification by any means virtually impossible. One expert on Russia, Lev Navrozov (1979: 1287-94) has stated that the Soviets have underground development, test, and production facilities that are located under existing factories and cities.

The opposition has many concerns relating to the concept of ratification by linkage--i.e., Russia is causing trouble all over the world, make them straighten up before ratification; Russia has placed troops in Cuba, make them remove the troops before ratification; increase U.S. defense spending by three percent this year, and by five percent next year prior to ratification.

Public interest groups of many sectors have taken an interest in SALT. The Association of United States Army, a lobby group (1979), has taken the position that the treat now being considered does not establish strategic weapons equality--it obscures the real weaknesses in our defense posture; AUSA cannot support ratification without a binding commitment from Congress and the executive branch to provide legislation and funding required to substantially recoup to growing imbalance in military capability.

A group made up of 150 religious leaders comprising 30 denominations and about 65 religious organizations started a drive during the week of September 19, 1979, to support ratification. The president of the National Council of Churches issued a statement:

> Never before has the leadership of so great a diversity of American religious organizations come together to say with one voice that arms limitations--through SALT II and SALT III--must be a priority of this nation.

The external situation in Russia, relative to the ratification of SALT II by the U.S., is one of belief that

the inclination of world events is right now in their favor, and that with the Carter administration in obvious disarray in Washington, they see no reason to refrain from cashing in wherever the change occurs (Dallas News, 1979). There were three major events that have occurred since the ratification procedures started in the U.S. to reinforce this attitude. These were:

1. The announcement by the United States that there are approximately 3,000 Soviet troops stationed in Cuba, whose mission cannot be identified. The statements were issued as if the troop placement had just occurred; however, further investigation revealed that they had been there since the early to mid-seventies. Russian reaction to demands to withdraw the troops was negative, stating that they were not combat troops and would not be removed. The Dallas Morning News editor thought that the presence of those troops was symbolic--just one more symbol of the determination of the Communists to pursue their destructive aims.

2. The Soviets established a base off Japan's northern island of Hokkaido, which was detected by satellite observation. Since Japan is not a superpower, it cannot react as one when an increased military threat is realized in strategically located areas. Japan is interested in increased trade with both China and Russia, and does not want to be accused of attempting to play one against the other (Huntsville Times, 1979). This planned action is also a furtherance of Russia's goals.

3. In view of the rearmament effort in the NATO alliance, Soviet party leader Brezhnev announced on October 6, 1979, that Russia would be willing to withdraw 20,000 men and 1,000 tanks from East Germany. This offer contained the proviso that NATO should not permit any additional nuclear weapons to be placed in Western Europe and, in general terms, Breshnev alluded that he would reduce the number of strategic weapons aimed at Europe. Some Western analysts see this as the Soviets having three main objectives: to try to prevent the emplacement in Western Germany and other NATO countries of hundreds of Pershing II and other ground-launched Cruise missiles targeted on the Soviet Union; to try to use the missile issue to divide Washington and its NATO allies--just as the Kremlin attempted some time ago with a similar propaganda campaign aimed against deployment of the neutron bomb; to reinforce at home, in Eastern Europe, and in the Third World, the Soviet Communist Party's self-perceived role as the major peacemaking force in the world (Huntsville Times, 1979).

GLOSSERY

Acronyms and Definitions

Anti-Ballistic Missile (ABM): Interceptor missile systems to counter strategic ballistic missiles or their elements in flight.

Arms Control and Disarmament Agency (ACDA)

Arms Control: The process of regulating the numbers of weapons systems to mutually agreed limits between two or more nations.

Circular Error Probable (CEP): Radius of a circle in nautical miles within which half of any given number of warheads are expected to fall.

Counterforce: Policy of targeting attacks against the opponent's nuclear strike force, thus presumably depriving him of the capability to retaliate.

Cruise Missiles: Un-manned, self-propelled, guided, weapon-delivery vehicles which sustain flight through use of aero-dynamic lift over most of their flight path and which may be flight-tested from or deployed on aircraft, ground or submarine.

Deterrence: The ability of a nation to persuade an adversary that costs and risks accompanying an attack are greater than benefits to be obtained from the strike.

Essential Equivalence: Concept that requires U.S.-Soviet strategic capabilities to be effectively equal but not necessarily identical in numbers.

Finite Deterrence: Sufficient force, after the absorption of a first strike, to inflict an arbitrarily determined level of unacceptable damage to the Soviet Union. Term is sometimes referred to as "assured destruction."

Fratracide: Destruction of one or more incoming warheads by the premature detonation of another.

Heavy ICBM's: Defined in SALT I as those ICBM's having a volume of 70 cubic meters (SS-11). Redefined in SALT II as having a volume equal to the SS-19, assumed to be greater than 100 cubic meters.

Intercontinental Ballistic Missile (ICBM): Land-based launchers of ballistic missiles capable of a range in excess of the shortest distance between the northeastern border of the Continental United States and the northwestern border of the continental territory of the U.S.S.R. (in excess of 3,400 miles).

Low Altitude Defense System (LoADS): ABM concept announced by the Army Ballistic Missile Defense Agency in early 1980.

Maneuverable Re-entry Vehicle (MARV): Launch concept similar to MIRV except re-entry vehicle possesses terminal guidance to evade defenses or correct targeting.

Multiple Independently Targetable Re-entry Vehicle (MIRV): Re-entry system launched from a fourth stage bus that carries a digital computer which permits positioning of the bus to separate a re-entry vehicle then fly to the next position, orient, and separate another vehicle. The re-entry vehicle with warhead does not possess a terminal guidance system.

Mutual Assured Destruction (MAD): Concept of strategic stability under which adversaries know that each retains capability to inflict massive levels of damage even after a first strike.

Missile Experimental (MX): Land-based mobile ICBM launcher concept being considered as a supplement/replacement for Minuteman. These ICBM's are to be deployed under a "hide the pea" concept wherein more launch sites than launchers exist. Configuration of the mobile launcher is such that it is impossible, by aerial means, to determine whether or not a missile has been deposited on a site.

Strategic Weapons: Weapons having nuclear capability and sufficient range to strike within the continental limits of an adversary.

Submarine Launched Ballistic Missile (SLBM): Launchers of ballistic missiles installed on any nuclear-powered submarine or launchers of modern ballistic missiles installed on any submarine regardless of type.

Tactical Weapon: Weapons having relatively short range, nuclear or non-nuclear capability, but not generally considered as being applicable to strategic use.