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Significant congressional legislative efforts have led the Department of Defense to develop a national missile defense (NMD) stategy employing ground-based interceptor missiles to defend all fifty states from a limited ballistic missile attack.

This thesis shows that a sea-based adjunct to a land-based system would be operationally and technically feasible, and it would provide significantly enhanced defensive capabilities over a land-based only NMD system. This study also uses legal treaty interpretation methods to show that the deployment of any NMD system would require modification to or withdrawal from the ABM Treaty. And if the United States decides to pursue modifications to the ABM Treaty, this thesis recommends they include allowances for sea-based NMD systems.

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FEASIBILITY EVALUATION OF EMPLOYING A SEA-BASED ADJUNCT TO THE UNITED STATES' NATIONAL MISSILE DEFENSE STRATEGY

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

JON C. KREITZ, LCDR, USN
B.S., Georgia Institute of Technology, Atlanta, Georgia, 1986
M.S., Naval Postgraduate School, Monterey, California, 1992

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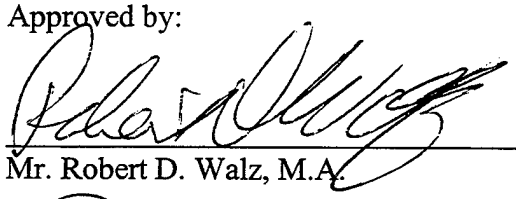

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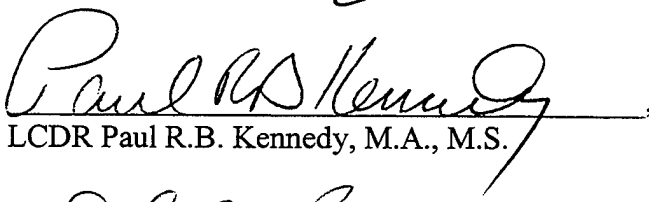

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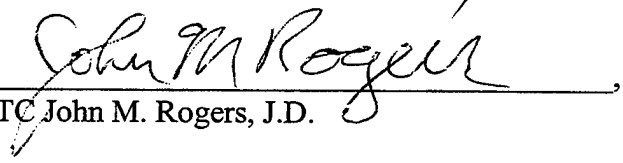

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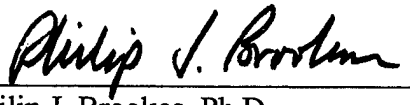

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ABSTRACT

FEASIBILITY EVALUATION OF EMPLOYING A SEA-BASED ADJUNCT TO THE UNITED STATES' NATIONAL MISSILE DEFENSE STRATEGY by LCDR Jon C. Kreitz, USN, 149 pages.

Germany's development and employment of the V-2 rocket in World War II ushered in a new era in warfare. During the Cold War, mutual assured destruction (MAD) was a key precept of both United States and Soviet Union strategic nuclear deterrence strategies. With the Cold War over, concern over the rapid proliferation of weapons of mass destruction amongst Third World rogue nations and the threat of an accidental or unauthorized ballistic missile attack has overtaken concern for an intentional nuclear attack by the former Soviet Union.

Significant congressional legislative efforts have led the Department of Defense to develop a national missile defense (NMD) strategy employing ground-based interceptor missiles to defend all fifty states from a limited ballistic missile attack.

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

ABM	Antiballistic Missile
ACS	AEGIS Combat System
ALI	AEGIS-LEAP Intercept
BMC3	Battle Management Command, Control, and Communication
BMC4I	Battle Management Command, Control, Computer and Communication Integration
BMDO	Ballistic Missile Defense Organization
C&D	Command and Decision
CARD	Cost Analysis Requirements Description
CEC	Cooperative Engagement Capability
CONOPS	Concept of Operations
DAB	Defense Acquisition Board
DACS	Divert/Attitude Control System
DOD	Department of Defense
GBI	Ground Based Interceptor
ICBM	Intercontinental Ballistic Missile
IR	Infrared
JFC	Joint Forces Commander
JPO-NMD	Joint Program Office for National Missile Defense
JTIDS	Joint Tactical Information Distribution System
KED	Kill Enhancement Device

KKV	Kinetic Kill Vehicle
KW	Kinetic Warhead
LEAP	Lightweight Exo-Atmospheric Projectile
MAD	Mutual Assured Destruction
NMD	National Missile Defense
NTW-TBMD	Navy Theater Wide – Theater Ballistic Missile Defense
PEO(TAD)	Program Executive Officer (Theater Air Defense)
SCC	Standing Consultative Commission
SM	Standard Missile
SMTS	Space and Missile Tracking System
START	Strategic Arms Reduction Talks
TADIXS	Tactical Data Information Exchange System
TBM	Theater Ballistic Missile
TBMD	Theater Ballistic Missile Defense
THAAD	Theater High-Altitude Area Defense
TIBS	Tactical Information Broadcast System
TMD	Theater Missile Defense
TRAP	Tactical Related Applications
TRE	Tactical Receive Equipment
TSRM	Third Stage Rocket Motor
VLS	Vertical Launch System
WMD	Weapons of Mass Destruction

CHAPTER ONE

INTRODUCTION

Background

Germany's development and employment of the V-2 rocket in World War II ushered in a new era in warfare, where countries face the threat of strategic ballistic missile attack. During the Cold War, mutual assured destruction (MAD) was a key precept of both United States and Soviet Union strategic nuclear deterrence strategies. Both countries agreed to limitations on defenses against ballistic missiles to ensure the viability of this strategy. This agreement was manifested in the 1972 Anti-Ballistic Missile (ABM) Treaty between the United States and the Soviet Union. This treaty, with its associated agreements, limits each member country to a single ABM defense site, containing no more than 100 interceptors, for the purpose of defending an inter-continental ballistic missile (ICBM) site or the nation's capital. Each country "undertakes not to deploy ABM systems for a defense of the territory of its country and not to provide a base for such a defense."[1] By limiting the deployment of ABM systems, both countries maintained a defensive posture whereby the populations of both sides would be devastated by a nuclear war (i.e., MAD). The strategy of mutual assured destruction remained a viable defense strategy for both superpowers throughout the Cold War.

With the Cold War over, concern over the rapid proliferation of weapons of mass destruction (WMD) and their potential use against the continental United States has overtaken concern for the nuclear arsenal of the former Soviet Union. As ballistic missiles proliferate around the world, it is becoming evident that the United States and her allies need strategic defenses. In the 1997 Annual Report to the President and the Congress, the Secretary of Defense established national missile defense (NMD) as the

second priority of the ballistic missile defense program (next to theater ballistic missile defense).[2]

The current administration policy on NMD, as explained in the Annual Report, is known as "three plus three." This policy requires the creation, within three years, of the NMD Deployment Readiness Program, "a technology and programmatic foundation upon which the United States could build if intelligence indicated that a strategic threat was emerging."[3] The policy then mandates that in the year 2000, the United States have the capability to deploy an initial NMD system within another three years. The Secretary of Defense also stated in the Annual Report that "the NMD Deployment Readiness Program will be conducted in compliance with the ABM Treaty. Depending on its configuration, a deployed NMD system could be compliant with the ABM Treaty as written, or might require amendment of the Treaty's provisions."[4]

The Joint Program Office for National Missile Defense (JPO-NMD) in the Ballistic Missile Defense Organization (BMDO) was established on 1 April 1997. According to senior analyst Jon Walman of the Center for Security Strategies and Operations at Techmatics, Incorporated, this new organization is responsible for developing the national missile defense strategy and providing management oversight of the NMD Deployment Readiness Program. The JPO-NMD is also responsible for the design, development, and demonstration of an NMD system by 2003 (if the administration directs it).[5] The Joint Program Office's current NMD strategy and readiness program do not include a sea-based element. This omission of a sea-based element is due to the ABM Treaty prohibition against developing, testing, or deploying sea-based, air-based, space-based, or mobile land-based ABM systems.[6]

Despite the current NMD strategy, a sea-based NMD adjunct would be a valuable addition to the strategy. This thesis uses government documents, interviews, secondary sources, and legal treaty interpretation methods to show that a sea-based adjunct to the

United States NMD strategy is feasible. It identifies several factors and issues surrounding the potential use of existing Navy surface ships as strategic defense platforms. This assessment focuses on technical, operational, and economic factors involved in employing U.S. Navy surface ships in a NMD role, as well as provides a limited legal assessment of the implications of the ABM Treaty on this strategy option. Understanding the technical, operational, and economic issues shaping a sea-based NMD capability is the first step in evaluating its feasibility. A review of the ABM Treaty is the other essential step in this evaluation, since the limitations of the ABM Treaty have effectively framed the political debate over whether the United States should pursue a NMD capability. This study argues two main points to show that a sea-based NMD element is feasible and should be incorporated as an element of the United States' NMD strategy. First, that the limitations of the ABM Treaty prohibit the development and deployment of any NMD system capable of defending all fifty states, thus a decision to deploy a NMD system will require the United States to either modify the ABM Treaty or withdraw from it. And if the United States chooses to develop and deploy a NMD system, the benefits of a sea-based NMD element (discussed in chapters four and five) warrant that any modifications to the ABM Treaty to permit national missile defense include provisions permitting sea-based NMD as well. Second, this thesis shows that it is technically, operationally, and economically feasible (in relation to other options) for U.S. Navy AEGIS combat system equipped surface ships to perform a NMD role.

A review of the background, history, and issues surrounding NMD is essential to understanding why the United States should pursue national missile defense and why a sea-based element should be included as part of the United States' NMD strategy. This chapter provides background on the NMD debate in America by introducing several factors shaping the NMD debate in Congress, within the Department of Defense (DOD), and in the public domain. The next section of this chapter provides a cursory review of

the evolving dimensions of the ballistic missile threat facing the United States. This review shows that the overriding question concerning NMD is not whether the United States needs to develop and deploy a system, but rather when (or how soon) should it be done? The third section shows that Congress recognizes the implications of the rapidly evolving ballistic missile threat and has been successful at elevating the importance of NMD within the BMDO. Although recent Republican congressional legislative attempts to force the administration to develop and deploy a national missile defense capability have been unsuccessful, continuing congressional pressure to deploy a NMD system may very well lead to an administration decision to do so. The fourth section of this chapter provides background on the ABM Treaty, associated protocols, and agreements that must be understood before evaluating the implications of the ABM Treaty on the United States' national missile defense strategy. The fifth and sixth sections further describe the current NMD strategy and NMD Deployment Readiness Program and provide an overview of the U.S. Navy Theater-Wide Theater Ballistic Missile Defense (NTW-TBMD) Program, respectively. The remainder of this chapter further defines the scope and nature of this study.

Ballistic Missile Threat

With the Cold War over, the threat of a nuclear war between the United States and the former Soviet Union has directly diminished. Even the threat of an accidental or unauthorized intercontinental ballistic missile (ICBM) launch from the former Soviet Union or China is considered to be remote by the Department of Defense.[7] Whether the United States should break with the bipolar MAD concept and develop defenses against the rapidly expanding WMD threat is being widely debated (as shown by the congressional actions discussed later in this chapter). The seriousness of the growing ballistic missile threat has fueled the growing debate over NMD. This section shows that

the proliferation of weapons of mass destruction among rogue nations and the possibility of an accidental ballistic missile launch or seizure of an ICBM site or sea-launched ballistic missile (SLBM) platform in the former Soviet Union or China represent new dimensions to the ballistic missile threat. These new dimensions to the threat pose serious risks to the United States, which together with the rapid pace at which rogue nations are developing and acquiring ballistic missile technology, justify further review of America's NMD strategy, and as this thesis shows, warrant the addition of a sea-based NMD element.

Proliferation

When the United States and the former Soviet Union signed the ABM Treaty, they were the only countries capable of launching major strategic ballistic missile attacks at each other. The proliferation of ballistic missile technology has radically altered this situation. Although the Department of Defense believes an unauthorized or accidental ICBM attack from the former Soviet Union or China is unlikely, it does believe that the rapid proliferation of weapons of mass destruction and their delivery systems has made their use "a likely condition of future warfare."[8] The proliferation of longer range missiles makes their potential use against the continental United States by rogue factions possible in the near future. This fact, along with accidental/unauthorized threats from other powers, represents a serious threat to the United States. This makes it imperative that the United States pursue an effective strategy for defending against this threat.

Frank Gaffney, Jr., a former Assistant Secretary of Defense, reported in a San Diego Union-Tribune article that recent national opinion surveys indicate that most Americans are unaware of the widespread ballistic missile threat, as well as some of the recent near nuclear confrontations that have occurred.[9] While estimates vary significantly, the Department of Defense believes more than twenty-five nations possess

ballistic missiles, while even more countries are attempting to purchase or develop them.[10] The reasons why many of these countries possess or are attempting to possess these weapons are based on their strategic value. Some nations desire these weapons to deter attacks from hostile nations, or simply to intimidate less powerful states. Of greater concern to the United States, in Proliferation: Threat and Response the Department of Defense states, "There also are situations where one of the motivations appears to be to develop NBC (nuclear, biological, or chemical) military capabilities as a means of offsetting the conventional superiority of the United States or other states with more capable conventional forces."[11] This option could manifest itself in the form of a Third World country attempt to blackmail the United States with the threat of a ballistic missile attack in order to persuade the United States not to intervene in the country's regional affairs.

Rogue Threats

Many of the countries aggressively pursuing increased ballistic missile capabilities are considered to be "rogue nations," or Third World countries that have an adversarial relationship with the United States. Rogue nations pursuing ballistic missile capabilities are creating a serious new dimension to the ballistic missile threat facing the United States. The probability of a rogue nation employing ballistic missiles against the United States in the near future warrants development of a national missile defense strategy capable of effectively defending all fifty states.

Joseph C. Anselmo, states in an Aviation Week and Space Technology article entitled "U.S. Faces Growing Arsenal of Threats," that, "The U.S. focus on developing anti-missile defenses has shifted to Third World 'rogue' threats as a result of the Persian Gulf War."[12] Consequently, Jon Walman asserts in his article "National Missile Defense and the Navy's Potential Solutions" that the differences between tactical and strategic

ballistic missiles are becoming less apparent as rogue states increase their development of both intercontinental missiles and weapons of mass destruction. Threat assessments of tactical ballistic missile developments are becoming increasingly relevant to the debate on NMD system deployment.[13]

Most Americans are aware of the threat that Iraqi ballistic missiles posed in the Persian Gulf War. In his article, Walman cites a Washington Post article that reports Iraq has continued efforts to produce WMD and develop ballistic missile technology despite the outcome of the War and United Nations Security Council sanctions prohibiting it from working on any missile system with a range greater than 93 miles.[14] Iraq's continued pursuit of ballistic missile technology definitely poses serious security risks to U.S. forces in the Arabian Gulf region, and could eventually pose a threat to U.S. territory.

Joseph Anselmo states that in the Middle East, however, it is Iran that poses the greatest threat to regional stability, according to Thomas G. Ward, Jr., director of security, intelligence, and countermeasures in the Ballistic Missile Defense Organization.[15] The United States is very concerned about Iran's accelerated development of a medium range ballistic missile capability.[16] Anselmo believes that "Iran wants to be self sufficient in producing (ballistic) missiles and is seeking help from nations such as Russia to extend the range of its missiles well beyond 1,000 km. (625 mi.)."[17] According to Israeli intelligence officials, Iran will complete the development of a medium-range ballistic missile capable of hitting Israel by the beginning of 1999.[18] The missile technology infrastructure Iran is developing to support their medium-range ballistic missile program could conceivably support a long-range strategic ballistic missile program early in the next century.

North Korea is at the top of the BMDO's Third World threat list because of their efforts to develop longer range missiles and their nuclear, chemical and biological

weapons programs.[19] According to Jon Walman, North Korea's "determined pursuit of ballistic missile technology, coupled with its political instability and severely depressed economy, has created a highly volatile situation."[20] "North Korea's development of the Taepo Dong 2 missile has emerged as a major issue in the U.S. debate over national missile defense, because it is believed to have a range that would allow it to reach parts of Alaska and the unpopulated western fringes of Hawaii."[21] Thomas G. Ward, Jr., estimates that North Korea may have this capability as soon as the first half of the next decade.[22]

Accidental or Unauthorized ICBM Launch Threats

Even though the likelihood of an accidental or unauthorized ICBM launch from the former Soviet Union or China is considered remote, it remains a real possibility, one that the United States should develop a capability to defend against. In an Aviation Week and Space Technology article, entitled "Russian Threat Still Massive," Joseph Anselmo relates a recent event described in a book by CIA veteran and former House National Security Committee staffer Peter V. Pry that almost resulted in an accidental Russian nuclear strike against the United States:

> In January, 1995...Norway's notification to Moscow that it intended to fire a scientific research rocket apparently never reached the military's general staff. The launch triggered a military alert in Russia, and President Boris Yeltsin apparently activated his nuclear briefcase, the device designed to allow him to order a nuclear launch in the event of a surprise attack. Pry said the briefcase had never before been activated, not even during the Cold War. "That was an extraordinarily dangerous episode," he said. "For some perilous minutes, these guys were trying to figure out if this was the beginning of World War 3 and should they mount a massive nuclear response."[23]

Although the Russians quickly terminated their actions once they became aware of the situation, this episode clearly shows the potential for an accidental ICBM launch.[24] In addition to the concern over the possibility of an accidental launch, there are also worries about the Russian government selling its technology to Third World buyers to raise much needed revenue.[25]

Although it does not possess as large of an inventory as the Russian Federation, China also possesses the capability to attack the United States with ICBMs. According to Joseph Anselmo, "China is believed to have more than a dozen ICBMs capable of reaching the U.S., and its small arsenal is being modernized and expanded."[26] China hopes to develop the technology for multiple, independently targeted reentry vehicles (MIRVs), and mobile ICBM launchers, by "attempting to acquire components from the SS-18, which is the core of Russia's ICBM arsenal and has MIRV and advanced guidance capabilities."[27] While few expect China would directly attack the United States, U.S. intelligence community experts believe China may use their ballistic missile capabilities as a threat to exert even more influence in Asia, especially in their affairs with Taiwan. China has also generated concern by selling its ballistic missile technology to other nations.[28]

The Pace of the Ballistic Missile Threat

Much of the debate over if (or when) the United States should deploy a national missile defense system is centered on the pace of ballistic missile threat proliferation. There are conflicting reports discussing whether and when various rogue nations will have the capability to attack the United States with ballistic missiles. Two such reports are discussed below to illustrate that the pace of ballistic missile proliferation amongst Third World rogue nations is uncertain and may be significantly faster than the United States intelligence community believes.

The 1995 National Intelligence Estimate, NIE 95-19, concludes that there is no need to hurry the deployment of a NMD system because no nation beyond the major declared nuclear powers will be capable of hitting the United States with ballistic missiles until at least 2011.[29] The pace at which rogue states are acquiring ballistic missile technology, as discussed above, led an August 1996 United States General Accounting Office (GAO) report to state that the conclusions of NIE 95-19 are stated with too much certainty.[30] Indeed, despite United States' attempts to monitor and control the proliferation of weapons of mass destruction and ballistic missile technology, the threat of a ballistic missile attack from a Third World rogue nation, or an accidental/ unauthorized launch from the former Soviet Union or China is real, serious, and escalating.

Congress and National Missile Defense

The U.S. Congress has demonstrated increasing interest in ballistic missile defense. The past two Republican-led Congresses have been especially aggressive at pursuing legislation to mandate the development and deployment of a national missile defense capability. Jon Walman points out that, despite the legislative efforts of Congress, "the Clinton administration's 'three plus three' policy continues the development of theater ballistic missile defense systems, but defers a decision until 2000 on whether to commit to funding an NMD system for deployment by 2003."[31] The Republican-led Congress has repeatedly introduced legislation in an attempt to force deployment of a NMD capability. Their efforts include several bills, summarized below, which have had mixed results. Although the administration is still resisting these congressional efforts, the Congress has succeeded in elevating the importance of NMD within the Department of Defense. The previous legislative efforts discussed below,

combined with efforts underway in Congress now, may force the administration to openly pursue the deployment of a NMD system in the near future.

Ballistic Missile Defense Act of 1995

The Ballistic Missile Defense Act of 1995 was enacted into law as part of the National Defense Authorization Act for Fiscal Year 1996. The Act mandated deployment of an effective ABM system at the "earliest possible date." Other key findings expressed in the Act include:

> - The emerging threat...is significant and growing, both in terms of numbers of missiles and in terms of the technical capabilities of those missiles.
> - The trend in missile proliferation is toward longer range and more sophisticated ballistic missiles....
> - Determined countries can acquire intercontinental ballistic missiles in the near future and with little warning by means other than indigenous development.
> - The concept of mutual assured destruction (based upon an offense-only form of deterrence)...is now questionable as a basis for stability in a multipolar world...
> - The development and deployment of a National Missile Defense against the threat of limited ballistic missile attacks would strengthen deterrence at the levels of forces agreed to...under START-I; and would further strengthen deterrence if reductions below the levels permitted under START-I should be agreed to...
> - It is the policy of the United States...to seek a cooperative, negotiated transition to a regime that does not feature an offense-only form of deterrence as the basis for strategic stability.[32]

After this act became law, Republican congressional leaders felt that the President failed to properly execute it, so they filed suit against the President in federal district court in an attempt to force the President to accelerate ballistic missile defense efforts.[33] The federal district judge in the case declined to make a ruling. Supporters of the

administration maintain that the technological complexity of developing ballistic missile defenses makes it unreasonable for Congress to attempt to legislate deployment dates. Representative Curt Weldon (R-PA), chairman of the House National Security Committee, Subcommittee on Defense Research and Development, on the other hand, completely disagrees. He blames the continuing starvation of dollars by the administration for causing the Department of Defense's slow development of ballistic missile defense systems.[34] The Republican-led Congress introduced new ballistic missile defense legislation in 1996 in a continuing effort to pressure the administration to both accelerate theater ballistic missile defense programs and to develop and deploy a NMD system by 2003.

Defend America Act of 1996

After successfully passing the Ballistic Missile Defense Act of 1995, Republican congressional leaders introduced an even stronger bill in 1996, entitled, the Defend America Act of 1996. The bill sought to establish a policy to deploy a national missile defense system by 2003 that: (1) is capable of providing a highly effective defense of the territory of the United States against limited, unauthorized or accidental ballistic missile attacks and (2) will be augmented over time to provide a layered defense against larger and more sophisticated ballistic missile threats as they emerge.[35] The bill specified that the United States should have a national missile defense architecture deployed by 2003. This architecture may include ground, sea, and space-based interceptors; space-based sensors; and battle management, command, control, and communications. And if passed, the Secretary of Defense would be directed to develop a follow-on program that

augments the initial NMD architecture, as the threat changes, to provide a layered defense.[36]

The House National Security Committee report on the Defend America Act of 1996 expressed concern:

> About the possible indigenous development or sale to third parties of space launch vehicles, which can be rapidly converted with little or no warning and only minor modifications to ICBMs capable of delivering nuclear, chemical or biological warheads against American cities....Any booster with the capability to lift a payload into orbit can also be used to deliver weapons of mass destruction on targets thousands of miles away. Thus, through the purchase of space launch vehicles, a nation can acquire a threatening ballistic missile capability under the guise of peaceful activity.[37]

The committee also noted with concern that "Russia is attempting to market...modified versions of the SS-25 ICBM as space launch vehicles. The purchase of space launch vehicles is one route by which proliferant states may seek to circumvent existing controls on the transfer of missile technology."[38]

Although this bill had 171 cosponsors, the Republican leadership believed it lacked presidential support and that it would not receive the required two-thirds majority to overturn a veto. Consequently the bill was never brought to a vote.[39] According to Jon Walman, "The bill's lack of support stemmed from the Congressional Budget Office's (CBO) estimate that an NMD system would cost between $31 billion and $60 billion and National Intelligence Estimate (NIE) 95-19, which concluded: 'No country, other than the major declared nuclear powers, will develop or otherwise acquire a ballistic missile in the next 15 years that could threaten the contiguous 48 states or

Canada.' "[40] Walman notes that the CBO estimate based its estimate on a NMD system capable of defending against an unauthorized Russian submarine launch of 200 reentry vehicles,[41] a much greater threat than the baseline NMD system is envisioned to counter. Additionally, he notes that an independent panel review of NIE 95-19, chaired by former Director of Central Intelligence Robert Gates, criticized the NIE on several shortcomings. Gates asserted that the NIE fails to address the possibility of rogue nations purchasing long-range ballistic missiles from other governments or commercial sources. Gates also criticized the estimate for its oversight of sea-based ballistic missiles of less than intercontinental range. Gates went so far as calling the report politically naïve.[42]

National Defense Authorization Act for FY 1997

The debate over intelligence estimates that ensued after NIE 95-19 led Congress to include an amendment in the National Defense Authorization Act for FY 1997 requiring the establishment of the Commission to Assess the Ballistic Missile Threat to the United States. "The Commission shall assess the nature and magnitude of the existing and emerging ballistic missile threat to the United States."[43] The Commission would be responsible for submitting annual reports to the Congress detailing the ballistic missile and WMD threat to the United States.

National Missile Defense Act of 1997

In January 1997, Senators Trent Lott (R-MS), Strom Thurmond (R-SC), and Robert Smith (R-NH) introduced a bill entitled the National Missile Defense Act of 1997. According to Jon Walman, "the bill is essentially a scaled-back, more carefully worded

version of the 1996 Defend America Act."[44] This bill would mandate the deployment of a NMD system capable of defending all fifty states against a limited ballistic missile attack by 2003.[45] Jon Walman points out that one of the key differences between this bill and the proposed Defend America Act of 1996 is that this bill would require the NMD system to only be "capable" of defending the U.S., as opposed to the previous bill's requirement that the NMD system be "highly effective."[46] This would essentially reduce the required capability of an initial NMD.

Additionally, the Lott bill "urges the President to pursue, if necessary, high-level discussions with the Russian Federation to achieve an agreement to amend the ABM Treaty to allow deployment of the national missile defense system."[47] According to Jon Walman, "If a new agreement is needed, the bill requires that it be presented to the Senate for advice and consent. Finally, if a new agreement is needed but not reached within a year from enactment of the bill, the President and Congress...('shall consider exercising the option of withdrawing the United States from the ABM Treaty in accordance with the provisions of Article XV of that treaty'[48])."[49] As discussed in the next section, new agreements to the ABM Treaty, signed in September 1997, have made it clear to the Congress that the administration would not support this bill. Consequently, even though the Senate Armed Services Committee reported this bill favorably without amendment to the Senate, the Republican Senate leadership has chosen not to bring it to a full vote.[50]

Continued uncertainty regarding the ICBM and WMD threats has caused increasing concern in Congress. Jon Walman summarizes the growing congressional consensus on NMD in the following statement:

> Despite differences over threat assessments and deployment schedules, there is growing consensus that an NMD requirement exists to defend against limited attacks from rogue states that don't adhere to "rational" laws of deterrence and to defeat the threat of an accidental or unauthorized launch from Russia or China.... Regardless of whether the threat to the nation is three years or 15 years away, it is inevitable—and there is certainly no question to its severity. The *only* question is: will the nation be ready and able to provide for its constitutionally mandated "common defense" when the time comes?[51]

Congress wants to be ready to defend the United States from a ballistic missile attack. To do this requires the deployment of a NMD system, and the deployment of a NMD system must take the limitations of the ABM Treaty into account.

The congressional efforts discussed above appear to be turning the tide with the administration. In a 26 February 1998 statement before the House Subcommittees on Procurement and Research and Development, Under Secretary of Defense for Acquisition and Technology Jacques S. Gansler said that it is a question of when, not if, the United States will deploy a national missile defense.[52] This statement, the first time an administration official has publicly stated that a NMD system will be deployed, was made in response to criticism from Representative Curt Weldon (R-PA). This statement will likely lead to additional congressional legislative efforts calling for a NMD deployment.

ABM Treaty

Before the impact of the ABM Treaty and the 1997 ABM/TMD Agreements on national missile defense can be assessed in chapter three, a review of their content and purpose is required.

1972 ABM Treaty and 1974 Protocols

The ABM Treaty, with its 1974 Protocols, was a product of Cold War tension between the United States and the former Soviet Union, designed to limit the development, testing, and deployment of defensive systems capable of intercepting strategic ballistic missiles. Its main purpose was to prohibit the two countries from deploying a national, strategic defense system that could negate the strategy of mutual assured destruction.[53]

Article I of the 1972 ABM Treaty prohibits the United States and the former Soviet Union from deploying ABM systems for the defense of their national territories and from providing the base for such a defense. Articles I and II of the 1974 Protocols amended Article III of the ABM Treaty to permit each country to deploy no more than one hundred fixed ground-based interceptors, at a single site, to protect either its capital or the area of ICBM silo launchers.[54] Article II of the treaty states that a "ABM system is a system is a system to counter strategic ballistic missiles or their elements in flight trajectory...."[55] Article V of the treaty states, "Each Party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based."[56] (This article unquestionably renders a sea-based NMD system non-compliant with the ABM Treaty in its current form. Chapter three of this thesis will address this issue in greater detail.) The remaining articles of the ABM Treaty largely provide for the maintenance and functioning of the Treaty.

As mentioned above, Article II of the ABM Treaty effectively limits "strategic" ballistic missile defenses, but nowhere does it define the term "strategic." Significant confusion has resulted over the years from the treaty's failure to define what a strategic ballistic missile is. Jon Walman points out in his article "National Missile Defense and the Navy's Potential Solution," "Since the treaty permits testing of any system against targets except those with flight characteristics of strategic ballistic missiles and does not address deployment of such non-strategic defense systems, their deployment is presumably permitted."[57] This conclusion, acknowledged by both parties of the ABM Treaty, permits the development of theater ballistic missile defenses (provided those systems have no strategic capability).

The ABM Treaty also fails to specifically define the term "external cueing." External cueing, in the context of the ABM Treaty, is the providing of early warning, tracking, and, potentially, fire control data to weapons systems from sensors not colocated with the ABM interceptors. The ABM Treaty does not place a "blanket" restriction on *external* cueing. Indeed, as Jon Walman points out, Henry Cooper, a former director of the Strategic Defense Initiative Office (SDIO), told the Senate Foreign Relations Committee on 26 September 1996 that ambiguity in the ABM Treaty would permit external cueing for some TBMD systems. According to Cooper, the Clinton administration has unilaterally precluded the use of external cueing for all TBMD systems, while excusing the probable Soviet use of cueing data from their Pechora Large Phased Array Radars for Moscow's BMD system.[58] Jon Walman states that the implications of this administration policy are severe.

> Analyses show that external cueing by other radars or space-based sensors would improve by a factor of *ten* the ability of an interceptor traveling at 3 km (1.86 miles) per second to hit a missile traveling at 1.5 km (.9 miles) per second. Allowing handover data--via either sea-based Cooperative

> Engagement Capability (CEC) or land-based sensors located on the nation's periphery--is thus essential for any NMD system to be effective.[59]

This statement by Henry Cooper makes it clear that the administration's unilateral restriction on external cueing places unwarranted, detrimental limitations on United States' ballistic missile defense programs.

1997 ABM/TMD Agreements

In November 1993, the United States began negotiations with the Russian Federation in an attempt to obtain an agreement on less restrictive limits on missile defenses. The primary goal of the United States was to obtain modifications to the ABM Treaty that would ensure planned TBMD systems would be ABM Treaty compliant. Negotiations ended on 21 August 1997 and resulted in the signing of five documents on 26 September 1997 in New York. These agreements effectively place even more prohibitions on strategic ballistic missile defenses. The five documents were the First Agreed Statement, the Second Agreed Statement, the Confidence-building Measures Agreement, the Memorandum of Understanding (MOU) on Succession, a "No-Plans Statement," and new Standing Consultative Commission (SCC) Regulations.[60]

The First Agreed Statement expressly states that land-, sea-, and air-based TMD systems are compliant with Article VI(a) of the ABM Treaty if: (1) velocity of interceptor missile does not exceed 3 km/sec, (2) velocity of ballistic target missile does not exceed 5 km/sec, and (3) range of ballistic target missile does not exceed 3,500 km.[61]

The Second Agreed Statement specifies that land-, sea-, and air-based interceptor missiles, interceptor missile launchers, and radars will not be tested, separately or in a system, against ballistic target missiles with velocities greater than 5 km/sec, and ballistic target missiles with ranges greater than 3,500 km. This statement also bans the development, testing, or deployment of space-based TMD interceptor missiles and space-based components based on other physical principles that are capable of substituting for such interceptor missiles.[62]

In the "No Plans Statement," each of the parties stated that it does not have plans to: (1) test land-, sea-, and air-based interceptor missiles whose velocity exceeds 3 km/sec against a ballistic target missile before April 1999, (2) develop TMD systems with interceptor missiles whose velocity exceeds 5.5 km/sec for land- and air-based systems or 4.5 km/sec for sea-based systems, or (3) test TMD systems against ballistic target missiles with MIRVs or against reentry vehicles (RVs) deployed or planned to be deployed on strategic ballistic missiles. The parties also agreed to provide information on the status of these statements annually.[63]

The Confidence-Building Measures Agreement applies to three named systems--the Army's Theater High Altitude Area Defense (THAAD) program, the Navy's NTW program, and the Russian SA-12 system--and all future "higher-velocity" TMD systems. The agreement specifies various notifications and information exchanges.[64]

The Memorandum of Understanding on Succession "multilateralizes" the ABM Treaty by expanding participation in the ABM Treaty from the singular "former Soviet Union" to the four successor states of Belarus, Kazakhstan, Ukraine, and the Russian Federation. The successor states assume all the rights and obligations of the former

Soviet Union. The successor states are also collectively limited to a single ABM deployment area with one hundred launchers and one hundred interceptor missiles.[65] Dr. Stephen Cambone of the Center for Strategic and International Studies stated in congressional testimony that since NMD would likely require amending the ABM Treaty, this MOU effectively makes the defense of the U.S. "subject to the approval not only of the Russian Duma, but the legislatures of states like Belarus, Ukraine and Kazakhstan."[66]

Ratification of the 1997 ABM/TMD Agreements will be in accordance with each countries' constitutional procedures. According to Ambassador David J. Smith, the First Agreed Statement, Second Agreed Statement, and MOUs must be sent to the U.S. Senate for advice and consent to ratification.[67] MAJ Alan Van Tassel of the Ballistic Missile Defense Organization has stated that this will not be done until the Russian Federation ratifies the Strategic Arms Reduction Talks II (START II) agreement, since it is not clear whether the Senate will give consent to these agreements.[68] Nevertheless, Ambassador Smith points out that in the meantime, the United States is bound by international law not to undercut the object and purpose of the agreements.[69]

In summation, there are several key resolutions reached in these agreements. First, the parties agreed that lower-velocity TBMD systems comply with the ABM Treaty if the target missile parameters specified in the First Agreed Statement are not exceeded. A precedent has been set for development of higher-velocity systems, since the parties agree they can be compliant. And, the development, testing, and deployment of space-based TMD interceptor missiles and space-based components based on other physical

principles (e.g., lasers) are banned. These agreements still have to be ratified; thus they will not enter into force until all the parties have done so.[70]

NMD Roles, Missions, and System Deployment Plans--The Current Strategy

This thesis does not propose a sea-based only national missile defense strategy. Instead, it shows that a sea-based adjunct to the proposed land-based NMD system is both feasible, and it would significantly enhance the effectiveness of the current Air Force and Army proposals. This section discusses the current NMD strategy and the Air Force and Army proposals for a NMD system. This discussion highlights some of the major service issues and system requirements concerning NMD and provides background information essential to the ensuing evaluation of a sea-based NMD capability.

The Ballistic Missile Defense Organization's JPO-NMD is developing numerous baseline NMD elements to provide a viable NMD foundation. The Joint Program Office's NMD system will have the role of defending against rogue, accidental, and unauthorized threat--not a heavy deliberate attack.[71] The JPO-NMD is responsible for coordinating the overall planning, development, and acquisition of this system. BMDO's strategy for creating ballistic missile defenses is to develop a "family of systems," in which each individual system can operate independently and can also be linked together to provide a layered system.[72] The majority of the systems being researched and developed are sensors and command, control, and communication systems. The current Joint Program Office for NMD weapons employment strategy includes only ground-based interceptors (GBIs). Specifically, under the ABM Treaty, the system is limited to a

maximum of one hundred interceptor missiles, one hundred launchers, and associated ground radars located at a single site.[73]

Both the U.S. Army and the Air Force would like to have the lead on the NMD program. They both have proposed systems to the Ballistic Missile Defense Organization in an effort to be tasked as the lead service in this high profile program. The Army has proposed a single-site system with one hundred GBIs launched by commercially provided space boosters. According to General Dennis Reimer, the Army Chief of Staff, the Army estimates its NMD proposal would cost $5-6 billion to develop and deploy.[74] The Air Force has proposed modifying twenty existing Minuteman III ICBMs, equipping them with kinetic kill vehicles, improving existing early warning radars, and adding three new ground based tracking radars (GBRs). Both the RAND Corporation and the Congressional Budget Office estimated that this NMD system would cost between $3.3 and $4 billion.[75] According to Jon Walman, the Air Force is also pursuing the development of the Space and Missile Tracking System (SMTS). SMTS is the low-earth orbit (LEO) portion of the Space-Based Infrared System (SBIRS-LEO). It is intended to provide increased capabilities for detecting ballistic missile launches, and it will provide midcourse tracking and discrimination data for NMD and theater missile defense systems.[76] The Air Force also plans to continue upgrading the command, control, and communications (C3) systems necessary to integrate and operate the NMD system. This C3 element of the NMD program is commonly referred to as BM/ C3 (ballistic missile/C3). According to Sidney Graybeal, an Alternate Executive Officer throughout the SALT-I negotiations and the first U.S. Commissioner of the Standing Consultative

Commission, neither service's proposed NMD option "is likely to provide operationally-effective defense of Alaska and Hawaii from ICBMs; neither will provide effective defense against future SLBM threats."[77] Sidney Graybeal has stated that a fully operationally effective NMD system for all fifty states will require at least a three- or five-site deployment--a system that would require an amendment to the ABM Treaty.[78]

According to Lisa Burgess and George Seffers, Defense News staff writers, the Ballistic Missile Defense Organization is expecting to award a systems integration contract for the NMD missile system this month.[79] The contract will be awarded based on responses to BMDO's NMD Request for Proposals (RFP). The NMD RFP tasked the lead systems integrators (United Missile Defense Company and Boeing Company, Seattle) to "study" three, increasingly capable, NMD architectures:

> • C1: A single site with 20 GBIs tipped with exoatmospheric kill vehicles, a collocated GBR, assisted by upgraded early warning radars—possibly forward based X-band radars—and BM/C3 (Battle Management Command, Control, and Communications) equipment;
> • C2: A similar single-site architecture that uses 100 GBIs and integrates SMTS orbiting sensors;
> • C3: An option that would adapt the C2 architecture to a multi-site deployment within the United States with the appropriate number of GBIs.[80]

According to Jon Walman, BMDO officials have acknowledged the multisite deployment option addressed in "C3" would not comply with the ABM Treaty. Despite BMDO's willingness to consider a multisite NMD option (a necessity according to Sidney Graybeal) that clearly is not compliant with the ABM Treaty, the NMD RFP does not indicate any interest in studying sea-based, space-based, or mobile land-based NMD

options.[81] Although BMDO has effectively ruled out a sea-based NMD option up to this point in time, the potential benefits of this option still warrant additional study.

The sea-based NMD option considered in chapter four of this thesis involves the employment of U.S. Navy surface combatants equipped with the AEGIS combat system and new variants of the STANDARD missile (SM) in a NMD role. AEGIS ships that may contribute to NMD include the twenty-two vertical launching system (VLS) equipped cruisers of the Ticonderoga class and the fifty-seven destroyers of the Arleigh Burke class (twenty-seven have been delivered through fiscal year 1997, with the remainder under construction or planned).[82] Provided the U.S. Navy is successful in developing the SM-2 (Block IVA) and SM-3 surface-to-air missiles, AEGIS ships may be able to provide the entire United States, including overseas territories, with an additional defensive umbrella to guard against ballistic missile attacks. This study does not propose that a sea-based NMD system supplant the current NMD baseline system, but rather that a sea-based adjunct, based on the Navy Theater-Wide Theater Ballistic Missile Defense (NTW-TBMD) program, augment the planned land-based NMD system, providing additional layers of defense, or "defense in depth."

U.S. Navy Theater-Wide Theater Ballistic Missile Defense Program

A basic knowledge of the U.S. Navy's Theater Ballistic Missile Defense (TBMD) programs is a necessary before evaluating the feasibility of a sea-based NMD adjunct. Below are brief summaries of the Navy Area TBMD program, and a more importantly, of

the Navy Theater-Wide TBMD program, which could serve as the basis of a sea-based NMD capability.

The U.S. Navy's AEGIS combat system equipped ships will soon have the capability to perform Navy Area TBMD functions, with even more enhanced capabilities being developed as part of the Navy Theater-Wide TBMD (NTW-TBMD) Program. Previous analysis by the Department of Defense's ABM Treaty Compliance Review Group has determined that deployment of the baseline (initial production) NTW-TBMD system would not violate the legal constraints of the 1972 ABM Treaty nor the September 1997 ABM Treaty Demarcation Agreements.[83]

The Navy Area TBMD system is designed to defend against short-to-medium range TBMs. This system will be most effective at providing seaport, airfield, and critical asset defense. The NTW-TBMD system will use kinetic warhead technology and have an ascent engagement capability, enabling it to defend against medium to long-range TBMs. This system will rely on an evolving series of STANDARD missile upgrades to provide theater-wide protection of assets, such as population centers, sea lanes, inland airfields, command and control nodes, vital political and military assets, and joint forces in the theater.

The Navy plans to use an "evolutionary" development approach with the Navy Theater-Wide TBMD program. The plan divides NTW-TBMD development into three phases: AEGIS lightweight exo-atmospheric projectile (LEAP) intercept, NTW Block I, and NTW Block II. The AEGIS LEAP intercept (ALI) phase is a series of test flights, using initial variant SM-3s against Aries target missiles. This phase will result in production of a system for deployment. NTW Block I is planned to be the first deployed

theater-wide capability. NTW Block I is envisioned to have a capability against the preponderant threat of *SCUD-C*, *NO DONG*, *M-9*, and other tactical ballistic missiles with warhead separation at ranges less than 1,000 km from the defending AEGIS platform. Beginning in this phase, the AEGIS combat system will have an ascent phase engagement capability, a balanced radio-frequency/infrared (RF/IR) debris discrimination capability, and will be capable of receiving theater cueing. NTW Block II will be able to defend against a future threat of tactical ballistic missiles with warhead separations at ranges greater than 1,500 km from the defending AEGIS ship, such as the *NO DONG*, *CSS-5*, and *TAEPO DONG*.[84]

International NMD Cooperation Efforts

The threat of limited ballistic missile attacks is not limited to solely the United States. Several foreign governments have indicated interest in working with the United States in developing sea-based TBM defenses. To many of these countries, a U.S. theater ballistic missile defense capability would give them a NMD capability. Cooperative TBMD development efforts and cost sharing would likely reduce the cost of developing a sea-based NMD capability, and thus possibly make this option even more economically feasible.

The potential for foreign investment/cost sharing and procurement of Navy TBMD (read NMD) systems is real. For example, the Japanese Maritime Self Defense Force has expressed growing interest in equipping their existing and planned AEGIS destroyers with a theater-wide TBMD capability to defend all of Japan. The U.S. will, however, have to be sensitive in dealing with a number of international and domestic issues affecting Japan's participation in U.S. missile defense efforts. Japanese foreign concerns include adverse reactions from regional neighbors, such as China, and Japan's

desire to stay out of ABM Treaty disputes between the United States and the Russian Federation.[85] Domestic Japanese concerns include a weak economy, government instability, and almost certain rejection by the vocal Japanese pacifist population.[86] In 1996, Spain initiated procurement of four AEGIS combat system equipped ships, which could also be equipped with a TBMD capability. Australia and Turkey are also evaluating procuring the AEGIS combat system or elements of it for their navies. Several NATO countries, including the United Kingdom, Germany, Spain, the Netherlands, Italy, and France, have also expressed an interest in developing sea-based TBM defenses jointly with the U.S. Navy. More and more countries are identifying a critical need for sea-based missile defenses, and they are showing the willingness to cooperatively develop, coproduce, or procure AEGIS TBMD capability. This willingness may benefit the U.S. by both providing additional funding sources for continued research and development and providing additional layered defenses courtesy of the United States' overseas allies.[87]

Assumptions

To determine whether it is feasible for U.S. Navy surface ships to be employed as a sea-based adjunct to America's NMD strategy, this study will make the following two assumptions: (1) the Navy Theater-Wide TBMD (Block II) program will be successfully completed as planned, and (2) the baseline NTW-TBMD system will be ABM Treaty compliant, thus analysis of ABM Treaty Compliance will center on evolved, enhanced versions of the NTW-TBMD system.

Definitions

ABM Treaty

The term "ABM Treaty" means the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, and signed at Moscow on May 26, 1972, and includes the Protocols to that Treaty, signed at Moscow on July 3, 1974.

1997 ABM/TMD Agreements

The term "1997 ABM/TMD Agreements" means the ABM/TMD Agreements between the United States of America and the Russian Federation, Belarus, Kazakhstan, and Ukraine, signed at New York on September 26, 1997. These agreements include a Memorandum of Understanding providing for succession to the ABM Treaty by those four states of the former Soviet Union (the states retaining control of strategic nuclear weapons). Additionally, two Agreed Statements relating to the ABM Treaty, dealing with lower and higher velocity theater missile defense systems, respectively; an associated Agreement on Confidence-Building Measures; and new Standing Consultative Commission (SCC) regulations that will govern multilateral operation of the Commission. The signatories also initialed a Joint Statement that provides for an annual exchange of information on the status of TMD plans and programs. Together, these documents clarify the demarcation between ABM systems, which are limited by the ABM Treaty, and TMD systems, which are not limited by the ABM Treaty.[88]

Limited Ballistic Missile Attack

The term "limited ballistic missile attack" refers to a limited ballistic missile attack as that term is used in the National Ballistic Defense Capstone Requirements

Document, dated August 24, 1996. The actual number of reentry vehicles (RVs) in a "limited ballistic missile attack" is classified, but can be assumed to be substantially less than one hundred. This document was issued by the United States Space Command and validated by the Joint Requirements Oversight Council of the Department of Defense.

Limitations and Delimitations

This study is concerned with evaluating the feasibility of developing and deploying a sea-based NMD element.

This thesis is unclassified to allow widest possible dissemination and consultation. Research will be accomplished using only unclassified sources.

This study does not definitively evaluate cost effectiveness of using AEGIS combat system equipped ships for NMD. It merely cites funding estimates and cost data available from other sources.

This study addresses current NTW-TBMD plans and capabilities and discusses how these capabilities could be evolved into a sea-based NMD adjunct. This analysis is not restricted only to programs that have already been evaluated as ABM Treaty compliant.

Significance

This thesis demonstrates that, given the evolving political environment surrounding NMD, there is a role for a sea-based adjunct to America's NMD strategy. The Navy has no ongoing efforts to develop or implement any elements of a NMD system, nor is it challenging the ABM Treaty or the existing ballistic missile defense political or organizational structures. The Navy is, however, supporting BMDO's JPO-NMD as a means to provide the analytical basis to facilitate full and effective Navy participation in future NMD programs. This study shows that despite the absence of

administration support for a sea-based NMD element, the Navy should play a role in America's NMD strategy. Additionally, this thesis shows that employment of an enhanced version of a proven, fielded weapon system using evolutionary acquisition methods would be both expedient and effective. To date, only land-based and space-based NMD options have been considered, and the majority of these systems are not even programmed to reach an operational status unless a specific threat is identified. And, as this thesis shows in chapter three, development and deployment of one of these systems would require modification to, or withdrawal from, the ABM Treaty. Likewise, the cost of developing some of the emerging technologies appears to be prohibitive in today's fiscally constrained environment. AEGIS ships are paid for and in the fleet in sufficient numbers to cover the entire continental United States, Hawaii, Alaska, Puerto Rico, and Guam. And just as important, this capability could be continuously upgraded (evolutionary, not revolutionary) without requiring significant funding since the upgrades will already be programmed as part of the Navy's regular overhaul and modernization program in support of other related roles and missions. And if the United States decides to deploy a NMD system and chooses to modify the ABM Treaty, the benefits of a sea-based NMD element warrant that any ABM Treaty modifications include provisions permitting sea-based NMD. This thesis will contribute largely to understanding the feasibility of employing Navy surface ships as a sea-based adjunct to America's NMD strategy. If the U.S. government chooses to employ surface combatants, the United States could conceivably have an effective sea-based NMD capability (albeit limited), capable of deployment within the next three to six years.

Scope and Organization of the Study

Intertwined technological and political issues have shaped the history of ballistic missile defense efforts in the United States. America's technological capability to

counter ballistic missile threats today is exponentially greater than it was in 1972 when the ABM Treaty was signed. And the Cold War fear of nuclear Armageddon has given way to fear of a WMD attack by a Third World rogue nation or an accidental/ unauthorized launch by one of the declared major nuclear powers. Given today's technological capabilities, the growing ballistic missile threat, and the political factors surrounding the ABM Treaty, the United States is wrestling with the decision of whether or not to develop and deploy a NMD capability. The recent statement by Under Secretary of Defense for Acquisition and Technology Jacques Gansler (discussed above) makes it clear that the political factors shaping this debate are shifting the consensus towards deployment of a NMD capability. This thesis will examine technological and operational issues that affect the feasibility of adding a sea-based adjunct to the current NMD strategy. It will also look at the politically charged issue of ABM Treaty compliance. This study will use a series of questions to focus the research. The primary question is whether it is feasible to employ U.S. Navy surface ships as an element of national missile defense strategy. The following chapters will attempt to answer this question by answering secondary questions.

Chapter two explores the state of the literature surrounding the NMD debate. This chapter will review literature on ballistic missile threats, NMD strategy and systems, ABM Treaty compliance issues, and U.S. Navy ballistic missile defense capabilities and limitations. This review will show that there has been significant research done in these areas, but with very limited exception, there is a void of literature concerning the feasibility and advantages of a sea-based NMD adjunct.

Chapter three shows that ABM Treaty provisions should not be used by the administration or Department of Defense as justification for excluding a sea-based NMD adjunct from the United States' NMD strategy. This chapter applies legal treaty interpretation methods to show that the deployment of any NMD system will require

modification to, or abrogation of, the ABM Treaty. This is a very significant point, in that the vast majority of NMD literature to date has concluded that some land-based NMD systems would comply with the ABM Treaty. It does this by summarizing the legal methods for interpreting treaties and some of the conclusions developed by Keith Sorge in Legal Implications of United States Ballistic Missile Defense Systems. Sorge's conclusions are then applied to the current NMD strategy to show that any NMD system capable of defending all fifty states would not be compliant with the ABM Treaty. This study then concludes that if the ABM Treaty must be modified to permit land-based NMD it should be modified to permit sea-based ABM defenses as well.

Chapter four is the crux of this thesis. It examines the questions, Is it technologically and operationally feasible for AEGIS-equipped ships to perform a national missile defense role? and Could these ships enhance a land-based NMD system to a degree that warrants their inclusion in the United States' NMD strategy? To answer these questions, a number of tertiary questions will be answered. This chapter discusses some of the effects of geographic ship positioning on performing a NMD role. It shows that the Navy can support and sustain NMD tasking with current fleet assets and within current deployment cycles. It shows that naval forces can be effectively integrated into the NMD architecture. It addresses some of the enhanced capabilities the Navy would require for NMD and discusses whether these capabilities are available. This chapter also shows that there is sufficient growth potential in the Navy's NTW-TBMD system to keep pace with evolving threats. And it discusses the self-defense capabilities of AEGIS ships when they are employed in a NMD role. This chapter also shows that a naval NMD system would be cost effective and that there is sufficient expertise and training in the Navy's AEGIS community to support a naval NMD program. A judgment as to the technological and operational feasibility will be made based on these factors. The

strength of this judgment rides on the strength of the assessment of these factors and on the conclusions drawn.

Chapter five summarizes the conclusions of the previous chapters to show the relative value a sea-based adjunct to the NMD strategy. Based on these conclusions, it outlines recommendations for future sea-based NMD efforts.

CHAPTER TWO

LITERATURE REVIEW

Research on missile defense over the past five years has focused almost exclusively on theater ballistic missile defense (TBMD) and cruise missile defense. The U.S. military's experiences with SCUD missiles during the 1990-1991 Persian Gulf War made the need to protect our forces in operational theaters very clear. Correspondingly, numerous military officials, statesmen, and civilian organizations have researched the technical, legal, and political aspects of providing a TBMD capability. Current Navy research, development, and acquisition plans forecast the operational deployment of an effective Navy Area TBMD capability by fiscal year 2001 and a Navy Theater-Wide TBMD capability by fiscal year 2004.

The question of whether the United States should develop and deploy a national missile defense (NMD) system has only recently regained significant interest in the Congress, conservative press and elements of the United States defense establishment. There have been limited works during the past couple years focusing on NMD strategy. Current NMD related research efforts have focused on ballistic missile threats, NMD systems and contingency deployment capabilities, and ABM Treaty compliance of generic NMD systems using ground-based interceptors.

This chapter explores the state of the literature surrounding the NMD debate. Consequently, it provides a review of literature on ballistic missile threats, NMD strategy and systems, ABM Treaty compliance issues, and U.S. Navy ballistic missile defense capabilities and limitations. To date, there have been very few works specifically dedicated to discussing the feasibility and advantages of employing U.S. Navy surface combatants as a sea-based adjunct to the NMD strategy, a niche this paper attempts to fill.

Ballistic Missile Threats

Advocates of deploying a NMD system routinely cite a variety of references describing the growing threat the United States faces from rogue states who are acquiring the capability to reach the United States with ballistic missiles. Few of these references provide solid evidence of when the threat will materialize. Additionally, most of these references do not provide specific timelines for when exactly the United States will face the threat of a ballistic missile attack from a rogue nation, but they do make it clear that there is a new dimension to the threat, and it is growing—it's a matter of when it will directly threaten the United States, not if.

Government Publications

The most recent National Intelligence Estimate (NIE 95-19) prepared by the U.S. Intelligence Community (IC) analyzing the threat to the United States from foreign missile systems has received mixed reviews from congressional members and other critics.[1] The National Security and International Affairs Division of the General Accounting Office (GAO) concluded in a 30 August 1996 report to the House Committee on National Security there were several shortcomings in NIE 95-19. According to the GAO, the main judgement of NIE 95-19--"No country, other than the major declared nuclear powers, will develop or otherwise acquire a ballistic missile in the next 15 years that could threaten the contiguous 48 states or Canada."--was expressed with overstated certainty. Additionally, it did not (1) quantify the certainty level of nearly all of its key judgments, (2) identify explicitly its critical assumptions, and (3) develop alternative futures.[2] The GAO report on NIE 95-19 concluded that the IC's shortcomings in collection of information on foreign plans and capabilities produced substantial uncertainties that do not support the level of certainty in the NIE's conclusions.[3]

In April 1996, the Department of Defense released a study entitled Proliferation: Threat and Response. The key finding of this report was that the threat was changing from global to regional. The report did not address the current ballistic missile threat to the United States, but it did note, however, that "...unlike during the Cold War, those who possess nuclear, biological, and chemical weapons may actually come to use them."[4] The report made no recommendations, but concluded by stating that "The end of the Cold War has reduced the threat of a global nuclear war, but today a new threat is rising from the global spread of nuclear, biological, and chemical weapons."[5] The updated, November 1997 version of this study paints an even greater danger to the United States and its military from nuclear, biological, and chemical attack. Secretary of Defense William Cohen comments in his opening message that United States defense planners must assume that use of chemical and biological weapons is a likely condition of future warfare. He also states there is a heightened prospect for these weapons being used against our people at home (i.e., there is a likelihood of attacks against civilians in the United States).[6]

The Director of the Ballistic Missile Defense Organization (BMDO), Lieutenant General Lester Lyles, in a statement to the House National Security Committee on 5 November 1997 expressed his view that the Department of Defense is very concerned with the rapidly evolving Iranian medium-range ballistic missile threat. Iran's potential to deploy missiles capable of reaching targets from 1,000 to 1,300 kms away is developing much quicker than expected. Iran has already conducted a successful test firing of a rocket motor for this program. Additional test firings are expected early in 1998, with a deployment capability possible as early as 1999.

Government Sponsored Research Papers

In Ballistic Missile Proliferation in the Third World: The Impact on U.S. Naval Operations, Lieutenant Commander Richard A. Holzknecht evaluates the impact of ballistic missile proliferation on the conduct of U.S. naval operations worldwide. His analysis of the state of Third World ballistic missile technology concludes that most Third World ballistic missile proliferants are determined to develop or acquire nuclear, chemical, and advanced conventional warheads. These warheads will give them reasonable probabilities of damaging intended targets at extended ranges.[7] This conclusion not only has implications for forward deployed naval operations, but for the potential threat against the United States as well.

Other Publications and References

Many publications on the subject of ballistic missile proliferation discuss technological capabilities. Technological capability alone is not sufficient to evaluate this growing threat. A June 1991 study by the Institute for Defense Analysis concentrated "on the role of ballistic missiles in the defense plans of Third World states rather than on the kinds of missile technologies they are seeking to acquire."[8] This study concluded there were four significant implications that defense planners needed to consider. These include:

- The likelihood of ballistic missile use in future regional conflicts appears high, especially in the Middle East and Southwest Asia. Consequently, the need for theater and limited protection anti-ballistic missile systems should increase in the near future.

- Technical capabilities are a major constraint on Third World targeting decisions. This is because their missile generally have relatively short

range, are not very accurate, have small payloads, have low per-day launch rates, and are generally armed with conventional warheads.

- Third World ballistic missiles are seen as a way of discouraging superpower intervention in regional conflicts. Failing that, some Third World leaders have announced a willingness (technical capabilities permitting) to strike offshore U.S. military bases or U.S. cities in retribution for U.S. military actions. This intention appears to be irrespective of the overall correlation of forces.

- Current lack of real-time, long-range reconnaissance capabilities means that Third World states can strike only targets which (1) have been identified and located before the conflict begins, and (2) remain stationary so that pre-war locational data remains accurate.[9]

In March 1996, the Heritage Foundation released a report entitled Defending America: Ending America's Vulnerability to Ballistic Missiles. This document was an update to their June 1995 report entitled Defending America: A Near- and Long-Term Plan to Deploy Missile Defenses. These reports, two of the very few addressing a sea-based NMD element, provide some of the strongest support for including the Navy as an essential element of America's NMD. Ambassador Henry Cooper, former Director of the Strategic Defense Initiative Organization (SDIO), chaired the Missile Defense Study Team. The main finding of both reports was that the United States has no defense against inter-continental ballistic missiles (ICBMs). The initial report stated that ICBMs marketed by the declared nuclear powers as space launch vehicles could provide rogue states with the ability to attack the United States. The 1996 update cited (but did not identify) authoritative administration officials as having testified to Congress in May 1995, that rogue states could threaten the United States with ICBM attacks in the next three to five years. Both reports concluded that ballistic missiles pose a clear, present, and growing threat to the United States and her allies overseas. The update report recommended the Navy's Upper Tier interceptor system (now called the Navy Theater-Wide TBMD [NTW-TBMD] system) be deployed as soon as technically feasible in

conjunction with the Brilliant Eyes space-based sensor system (later called the Space and Missile Tracking System [SMTS], and know known as the Space Based Infrared System [SBIRS] Low component).[10]

National Missile Defense Strategy and Systems

The literature summarized in this section discusses the current United States NMD strategy, and recommendations for its modification and deployment. As this section shows, many government officials and civilian authors have maintained that it is possible to deploy an ABM Treaty compliant NMD system provided the system uses no more than one hundred fixed, ground-based interceptors. Consequently, the majority of the recent literature on national missile defense strategy and systems has focused on systems employing fixed, ground-based interceptors. There has been a distinct shortage of literature addressing other NMD options.

Government Publications

There are several government publications which describe the current United States NMD strategy and deployment plan. Secretary of Defense William S. Cohen's Annual Report to the President and the Congress, April 1997, states that NMD is the second highest priority of the Ballistic Missile Defense Organization. Secretary Cohen describes the United States NMD strategy as a "3+3" strategy. America's NMD program, known as the NMD Deployment Readiness Program, will develop all the elements of a balanced, ABM Treaty compliant system, achieving a first test of an integrated system by fiscal year 1999 (three years from the creation of this plan). The United States will then be able to deploy an initial system, that may comply with the ABM Treaty as written, within three years of a decision to do so.[11] Under current legislation, this decision will not be made before the year 2000.

In the September 1996 NMD Deployment Readiness Program Overview, Colonel David F. McNierney, the then Acting Program Manager of BMDO's National Missile Defense Joint Program Office, summarizes America's NMD Deployment Readiness Program and describes the defenses being developed to defend the United States against ICBMs from the Third World. Nowhere in this paper does it mention Navy involvement in this program.

Government Sponsored Research Papers

Students at the various service and national war colleges have begun studying and publishing papers discussing the perceived necessity for developing and deploying a NMD system. One such paper is National Missile Defense (NMD)--Has Its Time Come? by Lieutenant Colonel David K. Barrett, USAF. In this paper Lieutenant Colonel Barrett argues, contrary to the views of the current administration, that the United States needs to deploy a NMD system now more than ever before. He believes that the U.S. is threatened more from the proliferation of weapons of mass destruction than from an unlimited nuclear war with the former Soviet Union.

National Missile Defense Contingency Deployment by Clifford E. Reeves is a recent work that looks at a "pathfinder" deployment capability of a NMD system within two years of a perceived threat. This work recommends allocating resources to provide for development of an emergency deployment capability concept that does not include any Navy surface ship assets.

Joint Theater Missile Defense by Howard I. Harmatz presents a brief overview of United States theater missile defense (TMD) initiatives to date. It identifies the threat, reviews current joint doctrine, and then presents a case that only a truly joint defense approach can effectively defeat any future employment of weapons of mass destruction (WMD) by theater missiles against U.S. forces or its allies. The argument that an

effective theater missile defense requires coordinated Army, Air Force, and Navy efforts may also have validity in a strategic missile defense environment.

Other Publications and References

In a 6 March 1997 statement before the Military Research and Development Subcommittee of the House Committee on National Security, Under Secretary of Defense for Acquisition and Technology Paul G. Kaminski gave a complete summary of United States ballistic missile defense programs. This statement outlined several key elements of United States NMD strategy. Under the "3+3" program, an initial operational capability (IOC) for an NMD system could be achieved by 2003 if a deployment decision is reached in 2000. The goal is to be in a posture to be three years away from deployment, ready to respond to the emergence of a threat. According to Mr. Kaminski, it does not make sense to make a deployment decision in advance of the confirmed emergence of a threat, because the United States would be making investments prematurely, resulting in a deployed system that would be less capable when it is really needed. In the absence of a threat, the plan is to continue NMD research to enhance the capability of the system that could be deployed when the deployment decision is made. The development program now underway will comply with the existing ABM Treaty. However, the system that is ultimately fielded, should a deployment decision be made in the year 2000 or later, might comply with the ABM Treaty, or might require modification of the Treaty, depending on what the threat situation requires. Mr. Kaminski emphasized that at this point, the United States has made no commitment to deploy a NMD system.

The U.S. Air Force Space Command (AFSPC) performs Battle Management, Command, Control, and Communications (BMC3) functions in the NMD development plan. According to the FY96 AFSPC National Missile Defense Sub-Mission Area Development Plan, NMD is one of three sub-mission areas under the Space Control

mission area along with Counterspace and Space Surveillance. The AFSPC is aggressively pursuing the supporting technologies required to overcome BMC3 deficiencies.

Pursuit of the Shield: The U.S. Quest for Limited Ballistic Missile Defense by K. Scott McMahon's book is one of the most current and comprehensive references on the subject of NMD. This book compares and contrasts the interaction between technology, threat perception, national security strategy, and the political forces that led to the rise and fall of a limited NMD during the Cold War era and to its resurgence in the 1990s. McMahon's goal is to develop a NMD strategy proposal that can generate enough support in the military, civilian, and political communities to sustain it through deployment and operations. McMahon develops eight major findings in his book:

- Political and social upheaval can strike strategic powers (e.g., China and former Soviet Union), thus threatening accidental or unauthorized missile launches.
- The global non-proliferation regime can slow, but it will rarely stop, proliferators determined to acquire NBC (nuclear, biological, and chemical) weapons and long-range ballistic missiles.
- New ballistic missile powers could threaten CONUS (continental United States) in the first decade of the twenty-first century, or sooner if proliferators exploit shortcuts to strategic rocket acquisition.
- The United States must make BMD (ballistic missile defense) force structure decisions on the basis of global strategic capabilities, not intentions, because today's friends could be tomorrow's enemies.
- The United States cannot count on deterrence to protect CONUS; rational and irrational enemies alike could threaten or carry out a missile strike on CONUS.

- In principle, the United States can mount credible defenses at both the strategic and tactical levels against terrorist NBC strikes (e.g., 'suitcase bombs'), as well as aircraft and cruise missiles.

- The U.S. commitment to protecting its allies and military forces by upgrading it defenses against theater ballistic missiles further highlights the vulnerability of CONUS and invites attack.

- Missile defense deployment timelines must be conservative in their anticipation of emerging threats. Deployments must be timed to permit extensive BMD training and exercises to ensure optimal performance when potential threats mature.[12]

Based on these eight findings, McMahon makes recommendations in the following three areas:

- BMD deployments and research and development (R&D) programs to meet current and potential future ballistic missile threats. (McMahon's recommendations do not include sea-based defenses.)

- ABM Treaty revisions that could be made to permit the suggested BMD deployments and R&D programs.

- Cooperative measures that could be undertaken with Russia and other countries to ensure that future BMD deployments are compatible with strategic arms reduction efforts, and that they promote world peace and stability in general.[13]

Although McMahon recommends ABM Treaty revisions to permit a robust NMD system, he believes that a land-based NMD system at a single site (i.e., Grand Forks, North Dakota) would comply with the ABM Treaty.[14]

NMD has also been discussed at some length in periodicals. Newspapers such as the Washington Times, the Washington Post, and the Baltimore Sun have printed cogent articles on NMD, largely advocating the need for a viable NMD capability. There have also been articles in numerous journals and magazines, including Defense News, Defense Week, and Airpower Journal.

ABM Treaty Compliance Issues

The ABM Treaty has been at the center of the recent debate over theater ballistic missile defense and national missile defense. The majority of the work in this area has focused on determining whether the various theater ballistic missile defense programs comply with the ABM Treaty. Some authors have attempted to extrapolate determinations of ABM Treaty compliance for theater ballistic missile defense systems to national missile defense systems. Few works have actually addressed whether the fundamental concept of a national missile defense system would be compliant with the ABM Treaty. This section summarizes literature on all of these aspects of ABM Treaty compliance. It will become clear that the lack of literature discussing the determination of ABM Treaty compliance of NMD systems, based solely on accepted legal treaty interpretation methods, warrants additional research efforts.

Government Sponsored Research Papers

In a May 1996 report entitled The ABM Treaty and National Ballistic Missile Defense Opportunities, F. S. Nyland examines the potential capabilities of ABM Treaty compliant ballistic missile defense systems. Nyland uses operational analysis methods to determine the defensive capabilities of ABM Treaty compliant systems against a variety of ballistic missile threat parameters. This report concludes that limited missile defense systems with up to one hundred ground-based interceptors based at one site, given that they meet certain performance goals, could defend against some potential threats. The reach of ground-based interceptors would have to be considerable, greater than those envisioned in terminal defense system concepts, such as in the current NMD deployment readiness program. Nevertheless, Nyland recommends defense planners examine and formulate concepts that comply with the ABM Treaty (one hundred ground-based interceptors at a single site). Limited attacks by rogue nations or accidental missile

launches could be met by effective ballistic missile defenses limited to one hundred ABM interceptors.

The December 1996 Issues in Space Law and Policy by Lieutenant Commander Steven A. Padget, USN discusses the delimitation and control of space, space debris, and the interpretation of the ABM Treaty. The report describes the traditional interpretation of the ABM Treaty, as well as the broad interpretation issued by the Reagan administration in 1985 and the permissive interpretation (also drawn up by the Reagan administration). The current U.S. administration has chosen not to pursue any of these interpretations, but instead has sought agreements with the Russian Federation based upon technical differences between theater missile defense systems and strategic missile defense systems. This difference is manifested in the terminal velocities of the interceptors and ballistic missiles, and the maximum range of the ballistic missiles. These changes the administration is attempting to make to the ABM Treaty will require the advice and consent of the Senate. Lieutenant Commander Padget seems to support the permissive interpretation as the preferred Treaty interpretation. On the other hand, he concludes "perhaps the U.S. should have more correctly executed Article XV of the treaty and withdrawn from it entirely."[15]

Legal Implications of United States Ballistic Missile Defense Systems by Keith M. Sorge also provides an analysis of the three ABM Treaty interpretations. This paper goes on to describe rules for interpreting treaties and uses them to evaluate the ABM Treaty compliance of the various U.S. TMD systems and a baseline NMD system (based on one hundred ground based interceptors at a single site). These interpretation rules, based on the Vienna Convention on the Law of Treaties, the Restatement (Third) of the Foreign Relations Law, and on opinions of the U.S. Supreme Court, will be considered in chapter three of this paper.

In the March 1996 Army War College report Twixt Scylla and Charybdis: Missile Defense and the ABM Treaty, Vincent J. Faggioli argues that the 1997 ABM/TMD Agreements negotiated by the Clinton Administration strengthened the ABM Treaty while permitting theater missile defenses capable of adequately defending U.S. forces.

James R. Greenburg in Theater Ballistic Missile Defense: New United States Strategic Requirements and the ABM Treaty concludes that the ABM Treaty remains useful for U.S. national security interests in the post-Cold War world and should be maintained as currently written. Greenburg further states that the ABM Treaty should not be multilateralized (contrary to the current administration's course of action).

On a different note, in Strategic Culture and Ballistic Missile Defense: Russia and the United States, Miriam D. Becker examines the strategic cultures of the United States and the former Soviet Union. Becker believes the post-Cold War Russian strategic culture is moving beyond the old Soviet culture, providing potential opportunities for future participation in a global protective system, the sharing of early warning data, and the transfer of BMD technology.

Other Publications and References

Defending Deterrence: Managing the ABM Treaty Regime into the 21st Century, edited by Antonia Chayes and Paul Doty is one of the few authoritative published works on the ABM Treaty. It is a year-long study by a group of technical, legal, and military experts with wide-ranging policy and political views. This book attempts to determine whether and how the underlying objectives of the ABM Treaty can be preserved in a rapidly changing technological and political environment. In their analyses, the authors presume that the United States will continue to rely on the current nuclear deterrence strategy and will want to continue to support the ABM Treaty; therefore, they have focused on ensuring that technological developments in this area remain ABM Treaty

compliant. This book offers a framework and options for making NMD policy decisions based on technical issues the changing political environment. This book is a landmark work in that it not only discusses the substance of the ABM Treaty, but it offers a methodology for managing the ABM Treaty regime.

U.S. Navy Missile Defense Capabilities and Limitations

The literature on Navy strategic missile defense is virtually non-existent. With the exception of the Heritage foundation documents summarized above, and a handful of articles published in newspapers and periodicals, discussions of Navy ballistic missile defense capabilities have been limited to tactical and theater defense capabilities. Fortunately, much of the literature on Navy theater-wide TBMD has significance to a discussion of Navy strategic BMD capabilities, as will be discussed in Chapter 4 of this thesis.

Government Publications

The Navy Program Executive Officer (Theater Air Defense) Navy Theater Ballistic Missile Defense pamphlet provides an excellent overview of the Navy's area and theater-wide TBMD programs. The pamphlet outlines the threat facing forward deployed and expeditionary forces, the flexibility inherent in using sea-based defenses, the demonstrated capabilities of the AEGIS combat system, and the developments planned as part of the Navy Area and Navy Theater-Wide TBMD programs. The PEO-TAD Navy Theater Wide Theater Ballistic Missile Defense Preliminary Draft Cost Analysis Requirements Description (CARD)(Rev 0.1) provides a much more detailed description of the NTW-TBMD program. Program areas discussed in detail include: system overview, risk, system operational concept, quantity requirements, system manpower requirements, system activity rates, system milestone schedule, acquisition

strategy, system development plan, element facilities requirements, SM-3 technical parameters (unclassified values), and an AEGIS combat system computer program requirements outline.

The March 1996 Department of Defense Report to the Congress on Navy Theater Wide Defense System (Formerly Navy Upper Tier) describes two key advantages to employing sea-based TBMD assets. First, in an "overseas crisis" or "developing theater" scenario, the sea-based TBMD architecture would be highly effective. Second, the sea-based NTW-TBMD system, because of the projected SM-3 interceptor performance and the ability to forward deploy AEGIS ships, would have the ability to achieve ascent phase intercepts. The present NMD deployment readiness program, consisting of GBIs, would not have this capability. If a sea-based NMD component could provide this capability it would significantly improve engagement opportunities against ballistic missile threats. Engagement of a threat with more than one weapon system, during various phases of its flight would provide what is commonly referred to as "defense in depth."

Government Sponsored Research Papers

Numerous computer models have been developed to perform air defense simulations. Mark R. Rios in Optimizing AEGIS Ship Stationing for Active Theater Missile Defense used the Extended Air Defense Simulation (EADSIM) to determine the optimum stationing of an AEGIS ship in a TBMD role defending two cities. To aid in visualization of his results, Rios used three-dimensional surface and contour plots to display the optimal stationing area of a ship for a particular scenario.

The SM-X Flight Demonstration Program Provides the Foundation for Navy Theater-Wide Ballistic Missile Defense by A. Patel and others describes the interceptor development program for the NTW-TBMD program. The Navy is pursuing an evolutionary process, building upon the Navy TERRIER LEAP Technology

Demonstration Program and the SM-2 Block IV missile program. A description of how the planned flight test series will prepare the Navy for a near-term contingency capability and ultimately a highly capable objective system is also provided.

Other Publications and References

The December 1996 TMD Defense Planning study by H. K. Armenian, Et. Al. of Litton Systems, Inc., Data Systems Division used computer modeling to generate and evaluate attack and defense plans for various threats, sensors, weapons, and numerous missile threat origins. The study focused on the theater missile defense land- and sea-based defense planning problem where multiple theater ballistic missiles and theater cruise missiles are launched from numerous locations against many friendly assets.

The most significant periodical article advocating a role for the Navy in NMD was published in National Security Strategy Quarterly in the summer of 1997. In an article entitled "National Missile Defense and the Navy's Potential Solution," Jon P. Walman provides a coherent argument for both the acceleration of the development and deployment of a NMD system, and the consideration of employing sea-based NMD assets to help achieve a defensive umbrella.

In an article published in the September 1997 U.S. Naval Institute Proceedings entitled "Tomorrow's Fleet," Dr. Scott C. Truver mentions that a renewed commitment to NMD has lead some to propose a sea-based NMD solution. Although he does not say who has recently proposed a sea-based NMD system, Dr. Truver does make it clear that the ABM Treaty and the 1997 ABM/TMD Agreements are the focus of serious study within the Navy's TBMD community.

Taking all of these works into account, it becomes clear that there is a significant lack of literature on the topics of the legal implications of the ABM Treaty on NMD and

the feasibility and advantages of sea-based NMD. The following chapters of this thesis will attempt to help fill these voids.

CHAPTER THREE

ABM TREATY COMPLIANCE OF NATIONAL MISSILE DEFENSE SYSTEMS

Much of the debate over whether the United States should develop and deploy a national missile defense system centers on the legal restrictions of the ABM Treaty. Proponents of land-based NMD, such as Secretary of Defense Cohen[1] and Under Secretary of Defense for Acquisition and Technology Kaminski,[2] believe the deployment of a one hundred interceptor NMD system at a single land-based site might comply with the ABM Treaty, while sea-based NMD would not. And some civilian defense analysts, such as K. Scott McMahon are sure a land-based NMD system would comply with the ABM Treaty, while a sea-based system would not.[3] These beliefs have directed much of the NMD debate towards determining how robust and capable of a land-based NMD system the ABM Treaty permits. This chapter argues that this debate should not be limited to determining the extent of land-based NMD capability permitted by the ABM Treaty. Instead, the debate should be over determining whether the United States desires to modify or withdraw from the ABM Treaty to enable development of any NMD system, whether it be land-based or sea-based. To this end, this chapter presents an argument that shows any NMD system, in any form, capable of defending all fifty states would not comply with the current ABM Treaty. This leads to the conclusion that if: (1) the United States is intent on developing a NMD system, and (2) sea-based NMD is no more legally constrained by the ABM Treaty than land-based NMD is; then, it is legally feasible to add a sea-based NMD adjunct to the United States' NMD strategy.

Before the United States deploys a national missile defense (NMD) system, a determination of whether to modify or withdraw from the ABM Treaty will have to be made. This decision will be made based on both political and legal issues surrounding the ABM Treaty. This chapter does not delve into the political issues surrounding this debate. Instead, it presents a legal interpretation of the ABM Treaty's impact on NMD. And it concludes that the administration and Department of Defense should not use the provisions of the ABM Treaty as justification for excluding a sea-based NMD adjunct from the United States' NMD strategy because the ABM Treaty prohibits any form of national missile defense, including a land-based system.

This chapter summarizes the legal methods for interpreting treaties and some of the conclusions contained in Keith Sorge's thesis, "Legal Implications of United States Ballistic Missile Defense Systems." Sorge's thesis is one of very few scholarly works to analyze ABM Treaty compliance based on accepted legal treaty interpretation methodologies. The bulk of Sorge's conclusions address the ABM Treaty compliance of the United States' theater ballistic missile defense systems, but he also evaluates whether a NMD system capable of defending only the forty-eight contiguous states would comply with the ABM Treaty. This chapter will apply and expand Sorge's conclusions to show that any national missile defense system capable of defending all fifty states would require the United States either modify or withdraw from the ABM Treaty. And, if the United States chooses to modify the ABM Treaty, this thesis concludes that these modifications should include provisions permitting sea-based NMD as well.

This chapter begins by examining some of the most significant ambiguities in the ABM Treaty language to show that, although they create problems in determining compliance of theater ballistic missile defense systems, they have no effect on the NMD debate. Then, the rules Sorge used for interpreting treaties are discussed and applied to the ABM Treaty. An analysis of the legality of NMD research programs, particularly sea-based ones, follows. This chapter also provides a brief discussion of the options available to the United States to overcome the legal restrictions of the ABM Treaty should a decision to deploy a NMD system be made.

Compliance Determinations and Ambiguities in the ABM Treaty Language

In the United States, the Department of Defense is responsible for ABM Treaty compliance determinations. Specifically, the Office of Arms Control Implementation and Compliance within the Office of the Under Secretary of Defense for Acquisition and Technology, interprets and applies the guidelines of the ABM Treaty to determine whether U.S. missile defense systems comply with the ABM Treaty.[4] With the exception of the Strategic Defense Initiative (SDI), the United States has only used its compliance determination process to determine whether theater ballistic missile defense systems, such as the Theater High Altitude Air Defense (THAAD) system and the Navy Theater-Wide Tactical Ballistic Missile Defense (NTW-TBMD) system, comply with the ABM Treaty.[5] The results of these determinations are classified and have not been published. In conducting compliance determinations, the Office of Arms Control Implementation

and Compliance focuses on two main questions: will the system have the capability to counter "strategic ballistic missiles," and will the system be "tested in an ABM mode."[6]

Answering these two questions is not a straightforward process. Article II of the ABM Treaty states that the purpose of the ABM Treaty is to limit systems designed to counter "strategic ballistic missiles."[7] Although the term "strategic" is used repeatedly throughout the ABM Treaty, it is not defined anywhere in the text. Accordingly, the Office of Arms Control Implementation and Compliance has had to determine whether "tactical" ballistic missile defense systems could conceivably be employed as "strategic" ballistic missile defense systems without having clearly defined threshold criteria to base their determinations. Compliance determinations and the criteria used in the determination process are and will remain classified secret for the foreseeable future.[8] One of the main objectives of the 1997 ABM/TMD Agreements is to provide a quantitative demarcation between tactical ballistic missiles and strategic ballistic missiles in an effort to eliminate this ambiguity in the ABM Treaty language. Since these agreements have not been submitted to the Senate for advice and consent, they do not yet carry the full force of law.

The second question answered in the U.S. compliance determination process is also complicated by ambiguous ABM Treaty language. Without a firm, legal definition of "strategic" the parameters constituting an ABM role or mode cannot be specifically defined. Thus, in some cases, it may be impossible to state with complete certainty whether or not a ballistic missile defense system is going to be tested in an ABM mode.

The questions raised by the undefined terms discussed above have been at the center of intense debates over the compliance of theater ballistic missile defense systems. The questions all center on the issue of differentiating between "strategic" and "tactical" defenses. As a national missile defense capability is a strategic defensive system, none of the above issues play a role in the NMD debate. A determination of whether a NMD system complies with the ABM Treaty has to be made based on other ABM Treaty provisions and treaty interpretation principles. In this thesis, the determination will use the accepted legal methods espoused by Keith Sorge to show that a NMD system capable of defending all fifty states from a limited ballistic missile attack would violate the basic object and purpose of the ABM Treaty.

Treaty Interpretation

In "Legal Implications of United States Ballistic Missile Defense Systems," Keith Sorge identifies and uses three major legal sources to assess ballistic missile defense systems for Treaty compliance--the Vienna Convention on the Law of Treaties (hereinafter cited as the Vienna Convention),[9] the Restatement of the Law Third of the Foreign Relations Law of the United States (hereinafter cited as the Third Restatement),[10] and U.S. case law.[11] Sorge points out that, "The differences among the three could possibly lead to different interpretations of a treaty. This reality merely compounds the uncertainty already created by the wording of the ABM Treaty itself."[12] Sorge provides a review of these three sources to build the solid legal basis he used for assessing the legality of a ballistic missile defense systems in the context of the ABM Treaty.[13]

Sorge points out that the Vienna Convention generally has the greatest acceptance and prestige internationally. It was adopted on 23 May 1969 at the United Nations Conference on the Law of Treaties by a vote of 79 to 1. It entered into force after the 35th state ratified it on 27 January 1980.[14] Sorge concludes that the preamble makes it clear that the Vienna Convention does not only codify existing customary international law, but it incorporates new norms to provide for "progressive development" of new customary international law. Section 3 of the Vienna Convention, the section governing interpretation of treaties, "was adopted without a dissenting vote, indicating to some...that this section was merely a codification of existing customary rules of international law."[15]

Sorge points out that although the United States has signed but not yet ratified the Vienna Convention, the State Department declared in its 1971 Vienna Convention Letter of Submittal to the President that: "Although not yet in force, the Convention is already generally recognized as the authoritative guide to current treaty law and practice."[16] Sorge bases much of his analysis on Articles 31 and 32 of the Vienna Convention. These articles are reprinted below:

Article 31

General Rule of Interpretation

1. A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.
2. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes:
(a) any agreement relating to the treaty which was made between all the parties in connection with the conclusion of the treaty;

(b) any instrument which was made by one or more parties in connection with the conclusion of the treaty and accepted by the other parties as an instrument related to the treaty.

3. There shall be taken into account, together with the context:

(a) any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions;

(b) any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation;

(c) any relevant rules of international law applicable in the relations between the parties.

4. A special meaning shall be given to a term if it is established that the parties so intended.

Article 32

Supplementary Means of Interpretation

Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion, in order to confirm the meaning resulting from the application of Article 31, or to determine the meaning when the interpretation according to Article 31:

(a) leaves the meaning ambiguous or obscure; or

(b) leads to a result which is manifestly absurd or unreasonable.[17]

The second major legal source Sorge uses in his thesis is the Third Restatement. Sorge puts the authority of the Third Restatement into context by summarizing that, "though not a formal source of the law, the Restatement does provide a scholarly look at what the law is and what in the opinion of the American Law Institute it should be."[18] He notes its significance with regard to international law in his statement that, "It is noteworthy that whenever any U.S. federal court deals with an international legal problem, it invariably cites and quotes the (Third) Restatement as an accurate description of what international law is in a given area."[19]

Sorge uses Section 325 of the Third Restatement in his analysis, which states the following regarding treaty interpretation:

> (1) An international agreement is to be interpreted in good faith in accordance with the ordinary meaning to be given to its terms in their context and in the light of its object and purpose.
> (2) Any subsequent agreement between the parties regarding the interpretation of the agreement, and subsequent practice between the parties in the application of the agreement, are to be taken into account in its interpretation.[20]

Although the wording of this section is similar to the Vienna Convention, Sorge points out that it does have one significant difference—the Third Restatement takes a wider view of the use of the material comprising the negotiating history (known as *travaux preparatoires*) of treaties. The Vienna Convention adopted the approach that the text of treaties should control the interpretation, and the *travaux preparatoires* should only be used as a secondary source when the "ordinary meaning" of a treaty provision is ambiguous or obscure.[21] The Third "Restatement concludes that U.S. courts are likely to give considerable weight to the negotiating history in interpreting a treaty."[22]

Sorge defines the scope of the use of *travaux preparatoires*, as intended in the Third Restatement, as follows:

> "A court or agency of the United States is required to take into account United States materials relating to the formation of an international agreement that might not be considered by an international body such as the International Court of Justice."[23] Examples given include Senate debates and committee reports. This all-inclusive review of documents related to a treaty reflects the reality that when U.S. courts are interpreting a treaty they are determining "its meaning for purposes of its application as domestic law."[24] [25]

The final legal source Sorge uses for interpreting treaties is the opinions of the U.S. Supreme Court. He notes in the Third Restatement, "Courts in the United States have final authority to interpret an international agreement for purposes of applying it as law in the United States...."[26]

Sorge relies heavily on the case of United States v. Stuart, for identifying a number of rules the U.S. Supreme Court uses for treaty interpretation and deciding the intent of treaty parties.[27] In United States v. Stuart, the Supreme Court stated that, "The clear import of treaty language controls unless 'application of the words of the treaty according to their obvious meaning affects a result inconsistent with the intent or expectations of its signatories.'"[28] Sorge also points out that in this same case the Court also urged that when interpreting treaties reference should be made to "nontextual sources that often assist us in 'giving effect to the intent of the Treaty parties,'...such as a treaty's ratification history and its subsequent operation...."[29] According to Sorge, this case clearly shows that the majority opinion of the Court favored using the non-textual approach espoused in the Third Restatement.[30]

According to Sorge, the final treaty interpretation "rule" to come out of this case is that the U.S. Supreme Court has also accepted the principle that the practice of the signatories to a treaty, in carrying out the provisions of a treaty, provides evidence of its proper interpretation because the conduct of the signatories demonstrates their understanding of the agreement.[31]

Considering all three of these legal sources for interpreting treaties, Sorge bases his determinations of compliance with the ABM Treaty on the purpose and intent of the

Treaty text. When ambiguities or other difficulties arise in understanding the text, purpose, or intent of the Treaty, his analyses then look at the ABM Treaty's negotiating and ratification history as well as the past practices of the signatories. These two statements summarize the legal interpretation "tools" Sorge uses to evaluate compliance with the ABM Treaty.[32] The next section summarizes his conclusions (which are based on these tools) concerning NMD and applies them to the broader case of a system capable of defending all fifty states.

National Missile Defense and the ABM Treaty

As shown in the literature review on pages 40, 42, 44, and 45, many proponents of the current NMD strategy believe that a NMD system consisting of no more than one hundred fixed, ground-based interceptors would or at least may comply with the provisions of the ABM Treaty. Consequently, the current NMD strategy calls for a system consisting of either twenty or one hundred fixed ground-based interceptors, located at either a single site (Grand Forks, North Dakota--a "C1" or "C2" capability) or distributed between two sites (Grand Forks and Point Barrow, Alaska--a "C3" capability) to protect all fifty states from a limited ballistic missile attack. The ABM Treaty has several provisions which, when combined, make it clear that such a NMD system would not comply with the ABM Treaty, but first, a summary of Sorge's analysis and conclusions on compliance of a NMD system capable of protecting the forty-eight contiguous states is necessary.

Sorge bases his conclusions by analyzing the purpose and intent of Treaty Articles I, III, and V.[33] Article I of the ABM Treaty limits three things: (1) the deployment of a defense of the territory of the country, (2) the development of a "base" for such a defense, and (3) the deployment of a defense of an individual region of the country except as provided for in Article III of the ABM Treaty.[34] Article III of the ABM Treaty, along with the 1974 Protocol, permits a single ABM site with no more than one hundred fixed ground-based interceptors for the purpose of defending an intercontinental ballistic missile (ICBM) missile field or the national capital.[35] And, Article V prohibits the parties to the Treaty from developing, testing, or deploying ABM systems or components that are sea-based, air-based, space-based, or mobile land-based.[36] The limitations contained in these articles are examined by Sorge to evaluate the compliance of a forty-eight contiguous states NMD system. This analysis will be expanded to show that the current NMD strategy, and any other NMD options as well, do not comply with the ABM Treaty.

Sorge begins his analysis with Article I of the ABM Treaty. Article I prohibits deploying a system for the "defense of the territory of its country," or for the "defense of an individual region" except as permitted in Article III of the Treaty.[37] Since the NMD system Sorge examines leaves Alaska and Hawaii vulnerable to a ballistic missile attack, he concludes that an argument can be made that this system would comply with the ABM Treaty since the system would not be defending the "territory of its country."[38]

Although the ABM Treaty fails to define what constitutes an "individual region" or "territory of its country," these limitations do not apply to the current U.S. NMD

strategy. The current U.S. program is intended to defend all fifty states, which clearly constitutes a "defense of the territory of its country."

However, Sorge points out that the ABM Treaty also does not specify the extent of the term "defense."[39] Does it mean a complete defense against an all out nuclear attack by the former Soviet Union (i.e., a major attack), or does it mean defense against as few as one or two ballistic missiles (i.e., an accidental/unauthorized launch or a limited attack by a third-world rogue state)? The current argument justifying the need for NMD centers on the more likely scenario of a requirement to defend against a limited ballistic missile attack. Since the ABM Treaty does not specify the extent of prohibited territorial defense, Sorge's analysis turns to the guidelines of Article 31 of the Vienna Convention.[40] Article 31 requires that the terms of a treaty be interpreted in good faith and in the light of its "object and purpose." "The object and purpose of the ABM Treaty is to ensure that neither party will build a defense which can neutralize portions of a major nuclear assault from the other party,"[41] thus ensuring the validity of the MAD concept. This statement by Sorge does not provide for a definitive determination of the compliance of a single site NMD system with a "C1" or "C2" capability since it leaves the term "portions of a major nuclear assault" undefined. Consequently, Sorge does not draw any conclusions from this factor.[42]

Next, Sorge analyzes the case of a fixed land-based NMD system consisting of two or more sites (a "C3" architecture as discussed in Chapter One). He concludes that this configuration would clearly violate the provisions of the 1974 Protocol to the ABM Treaty.[43] The May 1996 report The ABM Treaty and National Ballistic Missile Defense

Opportunities by F. S. Nyland concludes that a single fixed land-based NMD site may be able to protect Hawaii, "if sensor and accurate tracking coverage can be provided along with appropriate command and control arrangements to assure timely commitment of interceptor assets."[44] However, according to non-attributable, independent computer simulations and analysis by a Washington, D.C. defense contractor, all fifty U.S. states cannot technically be defended from a single fixed ground-based interceptor site. Complete coverage of all fifty states would require at least two interceptor sites (a "C3" capability). This issue will likely be settled by the NMD lead systems integrators when they respond to the Ballistic Missile Defense Organization's (BMDO's) Request for Proposals (RFP). If they find that defense of all fifty states requires at least two land-based sites, such a NMD system would clearly not comply with the ABM Treaty.

Even if the NMD system envisioned by the Department of Defense is not intended to violate the provisions of the ABM Treaty concerning the protection of the national territory, it could provide a "base" for such a defense. This would clearly be a violation of Article I. This conclusion follows directly from Sorge's conclusion concerning a NMD system for defending the forty-eight contiguous states. "The phrase 'base for such a defense' was not defined in the Treaty, but looking at its object and purpose it becomes clear that the parties did not want one side to be able to develop systems which would rapidly allow for a complete defense of the territory."[45] Sorge states that if one party was allowed to develop such a "base," the other party would be at a considerable disadvantage. This situation would likely lead one or more of the parties to the Treaty to break with the Treaty altogether in order to develop ABM defenses to

counter the other party. Sorge believes this would clearly make the ABM Treaty of limited value by effectively ending it (contrary to Article XV which provides that the ABM Treaty is intended to be of unlimited duration). Likewise, this condition would adversely impact ongoing efforts for reducing strategic offensive nuclear weapons that would lead to a decrease in the risk of an outbreak of nuclear war. Based on these factors, Sorge concludes that developing and deploying a NMD system based on one hundred interceptors (or on any other system or principle), capable of defending a "significant portion" of the continental U.S. from a limited ballistic missile attack, would almost certainly be in violation of the ABM Treaty.[46] This conclusion directly applies to a system capable of defending all fifty states. Such a system, in any form, would clearly not comply with the ABM Treaty.

Sorge's final point of analysis centers on the space-based missile tracking system (SMTS [or SBIRS-Low]). His analysis centers on the undefined Article V term "component." He concludes that if SMTS is developed with a capability to communicate with the ground-based interceptors it would be a space-based NMD component, similar in character to an ABM radar, and would thus be prohibited by Article V. However, if SMTS is used only to pass information to ground-based Battle Management Command, Control, and Communications (BM/C3) assets, it would be considered a permissible "supplement" to the NMD system, not a prohibited space-based component of the NMD system. These conclusions apply equally to the potential role of SMTS in the current NMD strategy.[47]

After applying Sorge's analysis and conclusions to a NMD system capable of defending all fifty U.S. states, it is clear that such a system would definitely not comply with several articles of the ABM Treaty, it may not comply with other provisions, and it definitely would violate the Treaty's object and purpose.

Ballistic Missile Defense Research and the ABM Treaty

Article V of the ABM Treaty specifically prohibits the development, testing, and deployment of space-based, air-based, sea-based, and mobile land-based ABM components that are part of an otherwise fixed land-based ABM system.[48] However, in a chapter in Defending Deterrence, John Rhinelander and Sherri Wasserman Goodman state that, "During the Strategic Arms Limitation Talks (SALT) I negotiations, the United States insisted that Article V place no restraints on research or on those aspects of exploratory and advanced development that precede field testing."[49] Thus, although the United States cannot develop and deploy a sea-based NMD adjunct within the current limitations of the ABM Treaty, it can begin research on one without any modifications to the Treaty.

Modifications to the ABM Treaty

According to Article XV of the ABM Treaty, the Treaty has an unlimited duration.[50] If the United States chooses to develop and deploy a NMD system it will have to take action to deal with the prohibitions of the ABM Treaty. There are two options available to the United States to overcome the legal restrictions on NMD

development and deployment imposed by the ABM Treaty. The first option is to modify the ABM Treaty in accord with the provisions of Articles XIII and XIV of the Treaty.[51] The other option, discussed in the next section, is to withdraw from the Treaty, a measure permitted by Article XV of the ABM Treaty.[52]

Articles XIII and XIV provide the legal basis for modifying the ABM Treaty. Article XIII of the ABM Treaty establishes a Standing Consultative Commission (SCC) to promote the objectives and implementation of the provisions of the ABM Treaty.[53] One of the duties of the SCC is to "consider, as appropriate, possible proposals for further increasing the viability of (the ABM) Treaty; including proposals for amendments in accordance with the provisions of (the ABM) Treaty."[54] Article XIV provides that each party to the Treaty "may propose amendments to (the ABM) Treaty."[55] Besides the specific allowances for modification provided by these two articles of the ABM Treaty, Sorge's thesis states that both Article 39 of the Vienna Convention and the Third Restatement provide for amending treaties based on agreement between the parties.[56]

There has been significant debate the past few years concerning the requirement to submit the 1997 ABM/TMD Agreements to the U.S. Senate for advice and consent. The debate centers on whether the Agreements constitute modifications to the ABM Treaty, or are merely new agreed interpretations and protocols. According to U.S. constitutional law, modifications to treaties have to go through the same ratification process as the original treaty.[57] Additionally, Article 33 of the legislation establishing the Arms Control and Disarmament Agency (ACDA) requires that an international agreement limiting arms be subject to approval as a treaty or by joint resolution of

Congress.[58] Modifications to the ABM Treaty to permit deployment of a NMD system would be subject to the requirements of the constitutional law cited above, and as such they would require the advice and consent of the Senate.

Withdrawal from the ABM Treaty

The other option available to the United States to overcome the restrictions on NMD imposed by the ABM Treaty is to withdraw from the Treaty. Article XV of the ABM Treaty specifically states that each Party to the Treaty shall, "have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests."[59] To withdraw from the ABM Treaty, a Party is required to give the other Party six months advance notice and provide them a statement of the extraordinary events precipitating the withdrawal.[60]

Provisions of the Vienna Convention and the Third Restatement support the above option.[61] Sorge states that Article 54 of the Vienna Convention allows for withdrawal if both parties agree to it, or if the treaty specifically provides for unilateral withdrawal (which the ABM Treaty does).[62] And, Sorge cites Article 332 of the Third Restatement as additional support for this option.[63] Article 332 of the Third Restatement states that "The termination or denunciation of an international agreement, or the withdrawal of a party from an agreement, may take place only (a) in conformity with the agreement or (b) by consent of all the parties."[64]

According to Sorge, the final option for withdrawal is to invoke *rebus sic stantibus* (claim a "fundamental change of circumstances"). Both the Vienna Convention

and the Third Restatement provide for this. The drafters of the ABM Treaty intentionally chose broad language in an effort to create an agreement that would withstand the test of time. Terminating a treaty by claiming a fundamental change of circumstances, in accordance with the Vienna Convention and the Third Restatement, is a very restricted option.[65] This is not the best option available to the United States.

Withdrawal from the ABM Treaty based on the provisions of Article XV would be the least controversial legal basis for the United States to pursue.[66] To do this, Sorge states that the United States would have to identify which events are jeopardizing its supreme interests. He believes the United States could make a case that the proliferation of ballistic missile capabilities and weapons of mass destruction among Third World rogue states has produced a new and very serious threat to the United States and her allies that was not present twenty-five years ago.[67] "As there is no objective standard to measure the sufficiency of this justification, each party to the Treaty is the sole judge of what represents a threat to its 'supreme interests.' Thus the Russians would have no apparent legal basis to challenge...(such a) U.S. action."[68]

Even though the United States could make a seemingly plausible case for lawful withdrawal from the ABM Treaty, as Sorge points out, it is not that simple.[69] Political and foreign relations concerns will play a major role in any decision to withdraw from the ABM Treaty. The issue of who in the United States (the President or Congress) has the authority to terminate a treaty has not been legally resolved.[70] Sorge also points out that although the "U.S. Constitution provides guidance for the entering into treaty relations, (it) leaves unaddressed the issue of termination."[71] According to Sorge, this issue has yet

to be settled by the U.S. Supreme Court.[72] With specific regard to the ABM Treaty, the effect of withdrawal on the United States' relations with the former Soviet Union is likely to be hotly debated. As Sorge highlights, "It is worth recalling that even at the height of the SDI (Strategic Defense Initiative) debate President Reagan never recommended withdrawal from the Treaty. Hence, absent some truly 'extraordinary event', withdrawal is not a viable option."[73]

This statement, taken in conjunction with the application of Sorge's analysis and conclusions to a NMD system capable of defending all fifty states from a limited ballistic missile attack, leads to a logical conclusion. If the United States intends to deploy a NMD system, as the administration recently informed Congress it plans to do, the United States must negotiate modifications to the ABM Treaty to permit defense against limited ballistic missile attacks. And if the ABM Treaty must be modified to permit NMD, it would be beneficial to the United States to ensure the modifications also permit sea-based ABM interceptors.

CHAPTER FOUR

TECHNICAL AND OPERATIONAL ISSUES GOVERNING EMPLOYMENT OF U.S. NAVY SURFACE SHIPS IN A NATIONAL MISSILE DEFENSE ROLE

This chapter shows that it is technologically and operationally feasible for AEGIS equipped ships to perform a national missile defense role. It begins by assessing some of the key technological and operational factors surrounding the currently envisioned land-based national missile defense (NMD) system. Next, an overview of the Navy Theater-Wide Tactical Ballistic Missile Defense (NTW-TBMD) program is provided to give a base of knowledge for analyzing the potential for a sea-based NMD component and to show that it logically could be evolved into a NMD capability. Then, several key issues will be discussed and analyzed to determine the feasibility of sea-based NMD. This chapter concludes with a summary comparison of the following NMD alternatives: a single land-based NMD site; two land-based NMD sites; and a single land-based NMD site plus a sea-based NMD adjunct, with this last alternative providing the most effective option.

Fundamentals of Land-Based NMD

Before evaluating the feasibility of sea-based NMD, it is instructive to look at land-based NMD first to show that it provides a very limited defensive capability that could be significantly enhanced by a sea-based NMD adjunct.

Notional Land-Based NMD Engagement

The current notional land-based NMD system consists of the following elements: a single ground-based interceptor (GBI) site located at Grand Forks, North Dakota, with one hundred GBIs; a phased-array X-band ground-based radar (GBR), also located at Grand Forks; a command center at the North American Aerospace Defense Command (NORAD) and U.S. Space Command Centers inside Cheyenne Mountain, Colorado; Defense Support Program (DSP) satellites and potentially other space-based launch detection satellites; upgraded ground-based early warning radars (UEWRs); several forward-based X-band radars; and a battle management command, control, and communications system (BM/C3) to link all the elements together.[1]

Figure 4-1 shows a notional NMD engagement of a strategic ballistic missile threat using the currently envisioned land-based system. A nonnuclear, exoatmospheric, hit-to-kill NMD engagement is very complex as the following description from Stanley Kandebo's article "NMD System Integrates New and Updated Components" shows. The engagement begins with the launch of a ballistic missile. Space-based sensors detect the launch by the infrared heat emissions of the booster, and report the launch to ground-based BM/C3 nodes. The ballistic missile booster burns out, and the individual warheads and decoys deploy as a "threat cluster" once the missile enters the exoatmosphere. Upgraded early warning radars and ground-based radars detect, track, and count the number of missiles in the attack, and provide fire control data to the launch site (via the BM/C^3 system). The Space and Missile Tracking System (SMTS) would also be used to provide early warning and midcourse discrimination data. Discrimination, both by

SMTS and the exoatmospheric kill vehicle (EKV) of the ground-based interceptor, is key to sorting out actual warheads from decoys and other missile debris. The NMD command center orders the launch of the required ground-based interceptors to counter the incoming threat. The launch site performs pre-launch checks, loads predicted intercept data into the interceptors, and launches them on command. The ground-based booster burns out and separates. Once the interceptor is in the exoatmosphere, the EKV is released. The EKV receives in-flight updates to the predicted target intercept point until the EKV seeker acquires the threat cluster. It makes required divert and attitude adjustments throughout its flight while it resolves the individual objects in the threat cluster, performs final discrimination and target selection, and chooses its aimpoint. The final steps are EKV hit-to-kill, followed by a kill assessment and, if required re-engagement.[2]

Overall Effectiveness Assessment

The below sections summarize the effectiveness of the planned fixed ground-based NMD system within the two categories of performance issues, and technical and program issues.

Performance Issues

This section deduces several key performance factors associated with the planned NMD system architecture. First, extremely high interceptor velocities, greater than 7 kilometers per second, will be required to achieve kills in the exoatmosphere.[3] Relying

on a single GBI site (or two sites) in the United States creates several significant implications. By effectively waiting for the threat to close the United States, interceptors will face rapid closing velocities, requiring high acceleration diverts and attitude adjustments. Higher closing velocities will also shorten the time available for discriminating warheads from decoys and missile debris. Additionally, atmospheric conditions could affect the performance of infrared sensors, especially those in the EKV, reducing capabilities. (Clouds, humidity, suspended particulates, temperature, density, and other atmospheric properties directly affect performance of infrared sensors.) A potential adversary could launch an attack against the United States when heavy/high-altitude cloud cover, which may reduce the effectiveness of U.S. infrared sensors, obscures the U.S. NMD site.

By relying on one or two fixed sites, the NMD system would have a severely limited capability to adjust to changing threat locations. According to a non-attributable 1997 Washington, D.C. defense contractor study (referred to throughout the remainder of this thesis as "Study X"), computer simulations of land-based NMD engagements showed less than optimal performance for a single site system located at Grand Forks. Depending on the specific intercontinental ballistic missile (ICBM) launched, and from which site it is launched, a Grand Forks interceptor would have zero or at most one intercept opportunity against a Russian or Chinese ICBM targeted at Alaska or Hawaii. And portions of the western continental United States could only be defended with two engagement opportunities. A Grand Forks ground-based interceptor site could defend against a potential future Libyan site more effectively. Simulations show there would be

three or more engagement opportunities against ballistic missiles targeting the central and eastern continental United States, two opportunities for missiles targeting the western states, Hawaii, and most of Alaska. And the northwestern third of Alaska would be undefended. Computer simulation results show that a second site, located at Point Barrow, would be even less effective at defending all fifty states. Against a Russian ICBM threat, Point Barrow would have either zero or only one engagement opportunity against missiles targeted at the western half of Alaska or the eastern third of the continental United States. Hawaii would be defended with at most two engagement opportunities. The remainder of the United States could be defended with two or more engagement opportunities. A Chinese threat would result in zero or one engagement opportunity in defense of Hawaii, and two opportunities against missiles targeted at Alaska and the eastern United States. Against a potential Libyan threat, Point Barrow would have zero or only one engagement opportunity against missiles targeted at the eastern half of the continental United States. Although not available for inclusion in this thesis, the detailed computer simulations completed for this independent study showed there were significant portions of the United States indefensible from a single land-based NMD site. The fact that the U.S. ground-based interceptor site(s) would be fixed, and thus have set defensive coverage(s), could permit potential adversaries to adjust the launch locations of their ballistic missiles to minimize U.S. intercept opportunities. Additionally, one or two fixed land-based defensive sites could be easily targeted, and their limited defenses easily overwhelmed.

Political factors also must be considered in assessing the performance of this system. Ground-based interceptor launches from U.S. territory will likely be observed by civilians. The American public may not find the idea of launching interceptors virtually from their backyards very appealing. Another issue is that the infrared heat signature of a ground-based interceptor would look very similar to that of an ICBM. The launching of defensive ground-based interceptors from a site located near an ICBM field (as currently is planned) could conceivably create another crisis, one where the former Soviet Union believes the United States has launched an ICBM attack against it. Additionally, there would be safety concerns with identifying booster fall zones and ensuring the airspace around the launch site is clear of civilian air traffic.

Technical and Program Issues

As mentioned above, nonnuclear, hit-to-kill, exoatmospheric intercept of ballistic missile reentry vehicles is extremely complex. As highlighted in the December 1997 Government Accounting Office (GAO) assessment of the schedule and technical risks of the U.S. NMD program, "DOD (Department of Defense) faces significant challenges in the NMD program because of high schedule and technical risks."[4] To date, there have been no exoatmospheric hit-to-kill engagements demonstrated. The NMD acquisition strategy calls for conducting only one system test prior to the initial system deployment decision in the year 2000, and it calls for just one test of the integrated GBI before production of the interceptor's booster element begins.[5] The GAO report also concludes that increased funding will not significantly reduce schedule risk in the NMD program.[6]

This is based on the GAO reviewing the average time it took the DOD to acquire and field 59 other major weapon systems. The review showed that it took an average of just under 10 years from the beginning of development until these systems reached initial operational capability. None of these systems were developed and fielded in less than five years, leading the GAO to conclude that the "3 plus 3" NMD strategy faces exceptionally high schedule risks.[7]

Navy Theater-Wide Theater Ballistic Missile Defense (NTW-TBMD) Program

Program Overview

The Navy Theater-Wide Theater Ballistic Missile Defense program capitalizes on the over twenty years of successful research, engineering, development, and operational experience resident in the U.S. Navy's AEGIS program. The Navy has invested almost fifty billion dollars in the AEGIS program, which provides a solid base for extending sea-based air defense capabilities to include theater (and strategic) ballistic missile defensive capabilities. The Navy Theater Wide Ballistic Missile Defense Preliminary Draft Cost Analysis Requirements Description (CARD) states that, "The goal of NTW-TBMD is to develop Theater Ballistic Missile (TBM) defenses that will deny hostile forces the effective use of tactical ballistic missiles in all aspects of regional conflicts."[8] NTW-TBMD will provide protection against medium and long range tactical ballistic missiles to joint forces, population centers, vital political and military assets, command and control assets, sea lanes, and inland airfields.[9] NTW-TBMD will accomplish this by

providing the Navy with a capability to engage long-range TBMs in their ascent, midcourse, and terminal phases of flight, as well as provide a robust defense complimenting the Navy Area defense against medium range TBMs. Figure 4-2 shows notional NTW-TBMD engagements. The NTW-TBMD program will provide this capability at the earliest, economically feasible time by upgrading existing systems and leveraging the almost fifty billion dollar investment in AEGIS systems and infrastructure.[10] Figure 4-3 shows how the NTW-TBMD program begins with the AEGIS Weapon System, adds changes incorporated as part of the Navy Area TBMD program, and incorporates kinetic weapon technology to create a theater-wide capability.

System Description

Building on Navy Area TBMD modifications to the AEGIS Combat System (ACS), the NTW-TBMD program will make further modifications to the AEGIS Weapon System (the core element of the ACS), including computer program and firmware changes that will enable longer range TBM detection, tracking and engagement. Chapter 1 of the Navy Theater Wide Ballistic Missile Defense Preliminary Draft Cost Analysis Requirements Description (CARD) provides the following summary of modifications that will be made to the AEGIS Combat System as a result of the NTW-TBMD program. These modifications will provide a system baseline that could easily be expanded to support a national missile defense role.

> The AN/SPY-1B/D radar computer programs and firmware will be enhanced to allow search at higher elevations and longer ranges in order to detect long range TBMs, and to maintain track on fast ballistic missile targets. The Weapon Control System (WCS) computer programs will be

> modified to predict intercept points and engagement boundaries for long range ballistic targets, initialize the SM-3 missiles, conduct firings, and provide uplink commands to the second stage as the SM-3 missile flies to intercept the TBM. The AEGIS Display System (ADS) and the shipboard Command and Decision (C&D) system will also have their computer programs modified to include NTW TBMD doctrine and related cue processing, long range TBM threat evaluation and weapons assignment, acquisition and track stores data, and launch and impact point prediction to support possible counter-force operations. C^2 interfaces will be upgraded to increase compatibility with other Joint Force Command and Control components for the full theater.[11]

The NTW-TBMD CARD also provides the following description of the NTW-TBMD variant of the STANDARD Missile--the SM-3. The SM-3 would provide a technological base for a sea-based NMD interceptor.

> The SM-3 is an exo-only (exo-atmospheric engagement only) TBM interceptor which builds on the TERRIER LEAP technology demonstration and the AWS TBMD modifications made for the Navy Area TBMD program. Additionally, the system leverages off of existing equipment and computer programs, including, VLS (vertical launching system), SM-2 Blk IV, Advanced Solid Axial Stage (ASAS) rocket motors and other assets in development. The SM-3 consists of the MK 72 booster, MK 104 rocket motor, TSRM (solid propellant Third Stage Rocket Motor), and the LEAP KW (Light-Weight Exo-Atmospheric Projectile Kinetic Warhead) and accompanying nosecone assembly. The MK 72 and MK 104 are existing production rockets which constitute the propulsion for the SM-2 BLK IV and BLK IVA. The LEAP KW features an advanced technology Fiber Optic Gyro (FOG) based IMU (Inertial Measuring Unit) and avionics package providing inertial navigation and control of all stages, a high resolution imaging dual color IR seeker for long range acquisition, tracking and discrimination, Kill Enhancement Device (KED) to provide assured destruction of all target warheads, and a solid divert DACS (Divert/Attitude Control System) for adjustments during end-game trajectory.[12]

Figure 4-4 highlights some of these evolutionary changes that will be made to the AEGIS Weapon System.

NTW-TBMD Operational Concept

The NTW-TBMD Concepts-of-Operations (CONOPS) could easily be expanded to support a NMD role. They are based on recognizing that TBMs are but one of the many air threats (such as anti-ship cruise missiles, anti-ship missiles, aircraft, etc.) faced by a Navy battlegroup (BG).[13] NTW-TBMD system equipped ships will be assigned a TBMD role in addition to performing other warfighting responsibilities such as surface warfare (SUW), anti-submarine warfare (ASW), and strike warfare (STKW). Theater ballistic missile defense ships may operate independently, as units in battlegroups or task units supporting amphibious operations, or in support of theater ballistic missile defense for a friendly nation.[14] Command of these ships will be at the level of the naval component commander of a Joint Force Commander (JFC).[15]

NTW-TBMD ships will receive space-based system support in the form of alerts, cueing, and targeting information. Theater ballistic missile defense ships will also be capable of receiving alerting, cueing, and targeting data from organic theater, battlegroup, and Marine Air Ground Task Force (MAGTF) sources. This information will be transmitted over the Tactical Related Applications Program (TRAP) Broadcast and processed on the theater ballistic missile defense ship by Tactical Receive Equipment (TRE).[16] Alternate paths for receiving this information will include a theater Joint Tactical Information Distribution System (JTIDS) network, Tactical Data Information Exchange Subsystem (TADIXS A), and others.[17] Figure 4-5 shows the NTW-TBMD concept of operations described above.

Research, Development and Acquisition (RD&A) Strategy

The NTW-TBMD program will be presented to the Defense Acquisition Board (DAB) for formal review in April 1998. The Navy hopes to obtain approval, via an Acquisition Decision Memorandum (ADM), to proceed with its envisioned evolutionary NTW-TBMD acquisition strategy. This strategy would also support the evolution of the NTW-TBMD system into an "enhanced NTW" system capable of countering strategic ballistic missiles.

In a 27 January 1997 memorandum, former Under Secretary of Defense for Acquisition and Technology Paul Kaminski commended Department of Defense Program Executive Officers and Program Managers for developing and using evolutionary defense acquisition strategies.[18] Mr. Kaminski expressed his opinion that evolutionary acquisition strategies provide more acquisition efficiencies, cost savings, and flexibility to adapt to changing threats during the acquisition process, than the traditional "grand design" strategies, which are "characterized by a lengthy period of development, acquisition, and deployment of the total operational capability in a single program."[19]

The Navy is proposing a three-phase evolutionary acquisition strategy for the NTW-TBMD program. These phases are summarized in figures 4-6 and 4-7. Phase I, the AEGIS lightweight exo-atmospheric projectile (LEAP) intercept phase, is a series of test flights, using initial variant SM-3s against Aries target missiles. Some of the goals of this phase of the program are integration of LEAP to the AEGIS extended range STANDARD missile, and to conduct risk reduction activities such as kinetic warhead

(KW) lethality tests, seeker discrimination testing, and improve rocket motor technology and divert/attitude control system (DACS) propulsion capabilities.[20]

Phase II, NTW Block I, is envisioned to provide the first operational Navy sea-based theater-wide ballistic missile defense capability in the year 2002. The SM-3 missile in this phase will have a balanced radio-frequency/infrared (RF/IR) discrimination capability. The AEGIS Weapon System will also have a balanced RF/IR debris discrimination capability, and be able to receive theater cueing, and conduct ascent phase engagements.[21]

Phase III, NTW Block II, will be able to defend against future tactical ballistic missiles with warhead separations at ranges greater than 1,500 km from the defending AEGIS ship.[22] Initial operational capability for this capability could be as early as the year 2005 (or sooner with increased funding). The SM-3 missile in this phase will have improved discrimination, an advanced seeker, integrated guidance, lethality enhancements, improved divert and axial propulsion, and be limited to a terminal velocity of 3 km/sec.[23] The AEGIS Weapon System will incorporate improved high power discrimination. An Area Air Defense Commander (AADC) Battle Management Command, Control, Computer and Communication Integration (BMC4I) module will also be incorporated into AEGIS cruisers in the NTW Block II phase.[24]

Factors Influencing Feasibility of a Sea-Based NMD Adjunct

In 1996, the Ballistic Missile Defense Organization provided the U.S. Congress with a proposed concept for "Naval NMD."[25] The Ballistic Missile Defense

Organization (BMDO) envisioned employing a sea-based NMD system under two different deployment scenarios to provide a stand alone NMD capability. A "contingency/crisis" deployment would require seven AEGIS ships, five based out of the United States and two forward deployed overseas. A more severe "regional threat" scenario would require fifteen vertical launching system (VLS) equipped AEGIS ships, with five forward deployed overseas.[26] Sea-based NMD would require the development of a high-velocity (6-8 km/sec according to Rear Admiral Richard West, Deputy Director of the BMDO[27]), long-range STANDARD missile interceptor, enhanced SPY radar capabilities, cooperative engagement capability (CEC), space and missile tracking system (SMTS), and exoatmospheric kill vehicles (EKVs).[28]

BMDO's "Naval NMD" concept was provided to Congress as an alternative to a land-based NMD concept. The Ballistic Missile Defense Organization believed the system requirements specified above are technically feasible. A sea-based adjunct, augmenting a land-based NMD system, would require less capability, consequently, it is technologically and operationally feasible as the following discussion and analysis will show.

Notional Sea-Based NMD Engagement

Figure 4-8 shows a notional sea-based NMD engagement scenario. Comparison of this figure with the figure of a notional NTW-TBMD engagement shows they are similar in concept and operation. Many of the concepts, systems, and infrastructure

would be the same for both NTW-TBMD and sea-based NMD, thus the NTW-TBMD program could easily evolve to provide a NMD capability.

NTW-TBMD Evolution

A sea-based NMD adjunct would leverage the existing fleet of 22 VLS equipped AEGIS cruisers. The VLS equipped AEGIS cruiser fleet provides 2,684 VLS missile cells. If the ballistic missile threat ever evolves to require even more capability, the fleet of AEGIS destroyers, with more than 2,400 additional existing VLS cells, could quickly be modified to also give them a NMD capability. Despite the over 5,000 available VLS cells, an initial sea-based NMD adjunct using only sixteen cells on each of twelve AEGIS cruisers (192 total interceptor missiles) would provide a significant initial sea-based NMD capability, while retaining major growth potential. (This would also provide a negotiating point for ABM Treaty modifications, in that although 192 ABMs could defend against rogue threats or accidental/unauthorized attacks, it would not render the concept of mutual assured destruction [MAD] obsolete.)

Sea-based NMD would also build off the planned evolutionary NTW-TBMD program. It would use the following systems under development as part of NTW-TBMD: Cooperative Engagement Capability, Space-Based Missile Tracking System, and the Exoatmospheric Kill Vehicle. Many of the already existing key components, such as the vertical launching system, the STANDARD missile, and several command, control, and communications systems, are of modular design to permit future upgrades. It would

be a logical progression to evolve NTW-TBMD from a NTW Block I capability, to a NTW Block II capability, to an "Enhanced NTW" capability.

An "Enhanced NTW" capability could begin with an evolved SM-3 missile. The SM-3 missile design is physically capable of accepting seeker improvements and propulsion enhancements required to engage strategic ballistic missiles. The NTW-TBMD SM-3 missile could be modified to achieve a velocity of 4.5 km/sec, and still fit in a standard VLS cell. According to Study X, an improved missile, capable of reaching an intercept velocity of 5.5 km/sec, could be developed and deployed in current VLS cells. A further improved interceptor missile, capable of a 6.5 km/sec velocity, could be developed and deployed in a modified "6-pack" (i.e., 6-cell) vertical launching system module (vice the current 8-pack module). The FMC Corporation, manufacturer of the vertical launching system, has already completed the design and engineering work to produce 6-pack modules for other weapons applications.

Deployment Flexibility and Sustainability

The 22 vertical launching system equipped AEGIS cruisers of the U.S. Navy provide continuous presence around the world through regularly scheduled deployments and forward deployed homeporting. This continuous presence would support sea-based NMD stationing requirements. There are two vertical launching system equipped AEGIS cruisers homeported in Yokosuka, Japan, three in Pearl Harbor, Hawaii, six in San Diego, California, six in Norfolk, Virginia, and five in Mayport, Florida.[29] According to Navy plans, these are available for operational tasking more than 90 percent of the time in

between their ten-year regular overhauls.[30] On any given day approximately fifty percent of these ships are underway, either conducting deployed battlegroup operations or local operations near their homeports. Figure 4-9 shows the locations of deployed and underway AEGIS cruisers during April 1997. As Jon Walman points out in his article, "They are on station, ready to respond 24 hours a day, seven days a week without the permission of a 'host nation' or need for airlift or sealift."[31] Additionally, the majority of AEGIS ships inport could be "surged" on short notice to respond to contingencies or provide an increased strategic defensive posture, albeit for a limited duration. Without surging assets, the Navy can maintain twelve AEGIS cruisers at sea for an indefinite duration. This would provide enough at sea ships to perform a sea-based NMD adjunct role.

Geographic Positioning

Study X found that unlike the notional land-based single site NMD system, forward deployed AEGIS cruisers could defend Hawaii, Alaska, and Guam from ballistic missile attacks from any region of the globe. Moreover, placing sea-based interceptors near the threat ballistic missile launch area would enable intercepts during the ballistic missile's more vulnerable ascent phase.[32] As ballistic missile threats become more advanced, an ascent phase intercept capability will provide a critical tactical advantage. This is because advanced ballistic missile warheads will split or "fractionalize" after their ascent phase, making the discrimination and hit-to-kill process technologically more difficult.[33]

Sea-based NMD engagements would also provide other significant advantages due to the fact that ballistic missile intercepts would most likely occur over water, far from the continental United States and populated cities. First, this would minimize or eliminate interceptor boosters or missile debris from falling on U.S. soil, possibly injuring civilians or damaging private property. Second, sea-based NMD interceptors, would have slower velocities than land-based NMD interceptors or ballistic missiles, thus their infrared signature would be less than that of land-based NMD interceptors, intercontinental ballistic missiles, and sea-launched ballistic missiles. Smaller infrared signatures would make sea-based interceptor launches less likely to unintentionally trigger a nuclear retaliatory response from the former Soviet Union. And finally, forward-deployed AEGIS ships would provide a visible forward NMD presence that would deter the use of WMD and reassure allies.

Engageability

Study X conducted computer modeling and simulation of the defensive coverage of AEGIS ships modified for NMD, using interceptors with 4.5 km/sec, 5.5 km/sec, and 6.5 km/sec intercept velocities. Study X also looked at providing an adjunct capability to a land-based NMD system, using no more than twelve AEGIS cruisers, each with only 16 NMD interceptor missiles, employed in two distinct scenarios—one based on deployed presence forces and the other on surging an alerted response force. The deployed presence forces scenario used day-to-day global locations of deployed, forward homeported, and continental United States homeported AEGIS cruisers. The alerted

surge response force scenario envisioned temporarily repositioning AEGIS cruisers from their globally deployed and homeported areas when warning of a potential strategic ballistic missile attack is received. Figure 4-10 shows the number of intercept opportunities for sea-based based NMD assets employed against Chinese and Libyan ICBM threats. Higher velocity interceptors understandably would provide more intercept opportunities. The results displayed in figure 4-10 show that a sea-based NMD adjunct could provide between one and five intercept opportunities against these threats.

Defensibility

AEGIS ships are the most advanced and capable surface warships in the world. Even if tasked to conduct NMD, AEGIS ships would maintain a robust defensive capability in all warfare areas, especially in the critical area of cruise missile defense. Their open ocean mobility and defensive capabilities against air, surface, and subsurface threats would make them much less vulnerable to enemy attack than a single, fixed land-based NMD site.

Affordability

Sea-based NMD offers the least expensive option for limited NMD. Although this thesis does not advocate relying solely on sea-based NMD, it would be the most cost effective option. According to Under Secretary of Defense for Acquisition and Technology Jacques Gansler, the currently planned land-based NMD system will cost $3.6 billion to develop, while the cost of then deploying the system is unknown.[34]

According to the Ballistic Missile Defense Organization, in 1996, sea-based NMD would cost $3.5 billion to $5.5 billion to develop.[35] But, much of this cost would effectively be reduced by sharing land-based NMD development technology. Study X estimates this cost to be closer to $1.5 billion dollars today.

Although land-based NMD deployment costs are unknown, the Ballistic Missile Defense Organization estimates the cost of deploying a stand alone sea-based NMD capability ranges from $1.5 billion to $6.0 billion, depending on the number of interceptor missiles procured and number of ships upgraded for NMD.[36] According to Study X, a more modest sea-based NMD adjunct capability of 12 VLS equipped AEGIS cruisers with a total of 192 interceptors would cost approximately $1.0 billion to $1.2 billion to procure and deploy. Thus, a sea-based NMD adjunct could possibly be developed and deployed for approximately $2.5 billion—markedly less than the development cost alone of a land-based NMD capability.

Another affordability factor to be considered is life-cycle cost. Study X estimates the cost of operating, maintaining, and routinely upgrading a NMD land site with one hundred ground-based interceptors for twenty years would be approximately $3.5 billion, while the cost for operating, maintaining, and upgrading twelve AEGIS cruisers with 192 interceptors would be approximately $200 million over a twenty year span. The reason for this disparity is that the costs of adding a NMD role to the AEGIS cruisers would represent a relatively small, proportional increase to their existing operating and maintenance costs. If the administration decides that a single, fixed land-based NMD site would be insufficient, the procurement cost, and especially the low life-cycle cost of a

sea-based NMD adjunct makes it much more economically feasible and desirable than deploying and operating a second, fixed land-based NMD site.

Training and Experience

The Navy's AEGIS program has developed an extensive training infrastructure over the past twenty years, that has produced an exceptional cadre of experienced air defense tacticians and technicians. Although not specifically designed and trained to track ballistic missiles, AEGIS ships and their operators have already demonstrated the ability to track real-world theater ballistic missiles at ranges greater than 500 km. Recent examples of this include the March 1996 tracking of Chinese M-9 and DF-15 ballistic missiles by the *USS Bunker Hill* (CG-52) in the vicinity of Taiwan, and the tracking of Syrian Scud missiles by the *USS Mitscher* (DDG 57) in July 1996.[37] Although the operators of these ships were not specifically trained to configure and employ their AEGIS Combat Systems in a TBM tracking mode, the AEGIS training program had provided a broad base of knowledge that enabled fleet air defense operators to successfully track these ballistic missiles. The current AEGIS training program could easily provide the additional training AEGIS operators would require to perform NMD. Moreover, the knowledge and experience base resident in the AEGIS fleet would provide a solid foundation for NMD operations.

Technical Assessment

The above discussion highlights several key technical factors affecting whether a sea-based NMD adjunct is feasible. The nearly fifty billion dollar investment in the AEGIS program, coupled with an evolutionary development program, would enable a sea-based NMD adjunct program to capitalize on AEGIS Combat System robustness, STANDARD missile experience, exo-atmospheric kill vehicle development, Navy Area and Navy Theater-Wide TBMD developmental efforts, and land-based NMD research and development efforts. Figure 4-11 illustrates this evolutionary concept. Moreover, NMD-capable interceptor missiles can fit into VLS cells—either in existing "8-pack" modules or in new "6-pack" modules. Computer simulation and analysis by the Ballistic Missile Defense Organization and in Study X has shown that sea-based assets could conduct NMD engagements. And, current and planned NTW-TBMD BMC4I systems could provide the necessary ship and missile connectivity with NMD BM/C3 centers. In summary, these factors show that sea-based NMD is technically feasible.

Operational Assessment

The above discussion also highlights several key operational factors affecting whether a sea-based NMD adjunct is feasible. The current AEGIS cruiser fleet could provide a base for establishing a sea-based NMD adjunct. Day-to-day operations near continental United States homeports, forward-deployed homeports, and in deployed locations, place AEGIS cruisers in positions where they can conduct many NMD engagements. These day-to-day deployers could provide America's first line of defense

against ICBMs and SLBMs. The mobility of AEGIS cruisers would permit "surging" assets to temporary redeployment locations that would increase engagement opportunities. Homeported "ready forces" could provide defense-in-depth by engaging ballistic missiles not intercepted by the first line defenses. These engagements would be occurring in international waters, not over U.S. or foreign territory--a politically more acceptable option than conducting intercepts over U.S. or foreign territory. AEGIS ships would also be capable of defending themselves against attack. And the existing AEGIS training infrastructure and fleet air defense experience could easily support the additional requirements of NMD. In summary, a sea-based NMD adjunct could enhance overall NMD effectiveness, while employing AEGIS cruisers in a manner consistent and compatible with current fleet operations and roles.

NMD Strategy Options

The current NMD strategy includes two NMD deployment options--a single land-based NMD site and two land-based NMD sites. Based on the above technical and operational feasibility analyses, a third option would provide a more effective defense against a limited ballistic missile attack--a single land-based NMD site plus a sea-based NMD adjunct. Figures 4-12 and 4-13 show Study X computer modeling and simulation results of the probability of attack negation for each of these three options, defending against Chinese ICBM threats. The results in the first figure assume that U.S. interceptors will have a high single-shot probability of kill (SSPK), while the results in the second one assume a moderate SSPK. Overall, a single land-based NMD site at

Grand Forks would only have a 32-50 percent probability of destroying Chinese ICBMs aimed at all fifty states. Adding a second land-based NMD site would increase the probability of attack negation to 58-86 percent. The third option of a single land-based NMD site plus a sea-based NMD adjunct would provide significantly higher probabilities of attack negation: 74-97 percent for a 4.5 km/sec sea-based interceptor, 87-99 percent for a 5.5 km/sec sea-based interceptor, and 90-99 percent for a 6.5 km/sec sea-based interceptor. These results show that the addition of a sea-based NMD adjunct to the current NMD strategy would provide a significant increase in overall system effectiveness.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This thesis set out to determine the feasibility of employing a sea-based adjunct to the United States national missile defense (NMD) strategy. The recent strong congressional effort to pursue NMD coupled with the author's knowledge of current capabilities of and planned upgrades to the Navy's AEGIS program and the current land-based only NMD strategy, provided the impetus for this study of a sea-based NMD adjunct capability. The first step was to review the background of the NMD debate in America to show why this subject merits discussion. The review looked at the ballistic missile threat, congressional efforts to legislate NMD, the ABM Treaty, the current NMD strategy, and the Navy Theater-Wide Tactical Ballistic Missile Defense (NTW-TBMD) program. The next step was to determine whether a NMD system capable of defending all fifty U.S. states would comply with the ABM Treaty and show how this impacts the sea-based NMD issue. The third step was to determine the technical and operational feasibility of employing a sea-based NMD adjunct.

Conclusions

First, any discussion of NMD should begin with the ABM Treaty. The results of the legal analysis in chapter three show that the development and deployment of any NMD system, including a fixed land-based system with no more than one hundred ground-based interceptors (GBIs), capable of defending all fifty states would not comply with the ABM Treaty. If the United States proceeds with plans to deploy a NMD system,

the ABM Treaty will have to be modified or abrogated. If the United States chooses to withdraw from the ABM Treaty, an unlikely option, sea-based NMD would obviously be permitted. If the United States pursues the other more likely option of modifying the ABM Treaty, the enhanced effectiveness a sea-based NMD adjunct warrants an effort to pursue ABM Treaty modifications that would also permit sea-based NMD, even if only to provide a capability to counter a limit ballistic missile attack.

The analysis of several key technical and operational factors in chapter four shows that a sea-based NMD adjunct is feasible. Sea-based NMD would capitalize on the existing AEGIS program, planned evolutionary developments of the Navy Area and Navy Theater-Wide TBMD programs, and the Ballistic Missile Defense Organization's NMD program. The current fleet of twenty-two vertical launching system (VLS) equipped AEGIS cruisers could support NMD adjunct tasking within the framework of sustainable day-to-day global fleet operations. Surface ship mobility enhances sea-based NMD by providing improved coverage and more engagement opportunities due to improved intercept geometries (better angles, slower closing velocities would increase discrimination time and reduce the magnitude of interceptor exo-atmospheric kill vehicle [EKV] terminal diverts to aimpoint). And the existing AEGIS training infrastructure and fleet air defense experience would easily support the addition of a NMD role.

In addition to being technically and operationally feasible, a sea-based NMD adjunct would provide several significant enhancements to the current land-based only NMD system. First and foremost, a sea-based NMD capability would provide defense-in-depth by providing an ascent phased intercept capability, as well as midcourse and

terminal phase intercept capabilities--a significant advantage over the single terminal defense capability a land-based NMD system would provide. Sea-based NMD would also provide more and better coverage (greater probability of attack negation) of the United States and it territories. It would enable first intercept opportunities significantly farther away from U.S. territory, negating the concern over booster fall zone safety and reducing the potential of nuclear, chemical, or biological effects affecting U.S. territory. The cost of developing and deploying a sea-based NMD adjunct would be less than the cost of land-based NMD. The low procurement and life-cycle cost of a sea-based NMD adjunct make it much more economically attractive than procuring and operating a second land-based NMD site. Additionally, a sea-based NMD adjunct to a land-based NMD system would hedge against single site failure. And unlike a land-based NMD system, a sea-based NMD adjunct would be capable of defending against a limited SLBM attack. The bottom line is a land-based NMD system plus a sea-based NMD adjunct would be far superior to land-based NMD only.

Recommendations

This thesis provides a basic evaluation of the feasibility of employing U.S. Navy AEGIS cruisers in a sea-based NMD adjunct role. The conclusion of this evaluation is that a sea-based NMD adjunct is decidedly feasible and should be incorporated as part of the United States' national missile defense strategy. But, this study does not come close to addressing the complex technical, operational, cost, legal, and political issues and factors in enough depth to enable policy makers to actually make a decision on whether

to develop and deploy a sea-based NMD adjunct. To this end, the U.S. Navy and Ballistic Missile Defense Organization should conduct a detailed sea-based NMD adjunct concept definition study.

Since sea-based NMD research is permitted by the ABM Treaty, the Ballistic Missile Defense Organization should instruct the NMD Lead System Integrators (United Missile Defense Company and Boeing Company, Seattle) to study a fourth NMD architecture--"C4." This option would adapt the C2 architecture to a single land-based deployment plus a sea-based NMD adjunct.

Sea-based NMD, beyond the research stage, will require modification of the ABM Treaty. The Department of Defense should pursue modifications that would permit NMD, including sea-based, against a limited ballistic missile attack. The United States should make every attempt to reach a consensus with the former Soviet Union that a limited NMD capability would be in the best interest of all ABM Treaty parties, and that it would not negate the concept of mutual assured destruction or otherwise destabilize the nuclear deterrent posture of the Treaty parties.

While this thesis recommends pursuing a sea-based NMD adjunct program, it is strongly recommended that such a program should remain separate and distinct from the NTW-TBMD program. While it would be essential for a sea-based NMD program to evolve from a robust NTW-TBMD program, consolidation of these ballistic missile defense programs could adversely affect the NTW-TBMD program if the NMD program meets complications in the future. Keeping these programs separate would also keep the NTW-TBMD program compliant with the current ABM Treaty.

The Bottom Line

The bottom line of this thesis is that a land-based NMD system plus a sea-based NMD adjunct would be far superior to land-based NMD only. Before the United States commits to investing billions of dollars toward the development of a land-based only NMD architecture, it should carefully consider the numerous advantages of a sea-based NMD adjunct.

FIGURES

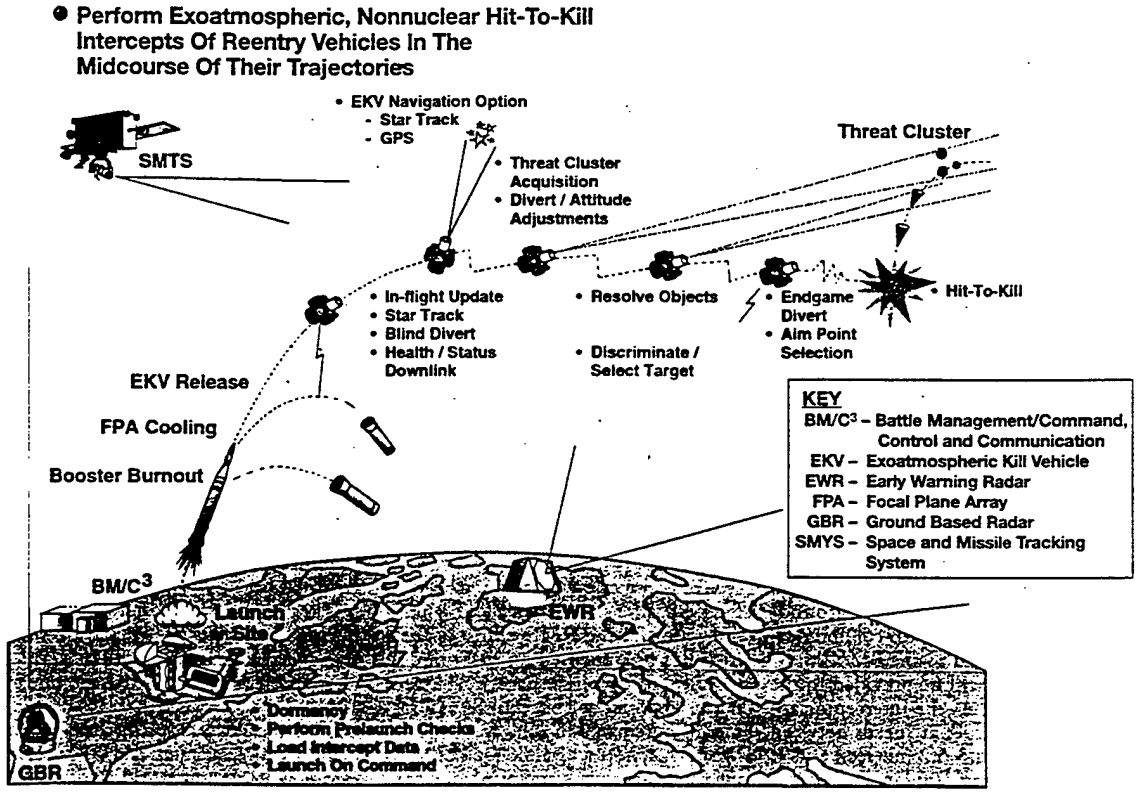


Fig. 4-1. Notional land-based NMD engagement.

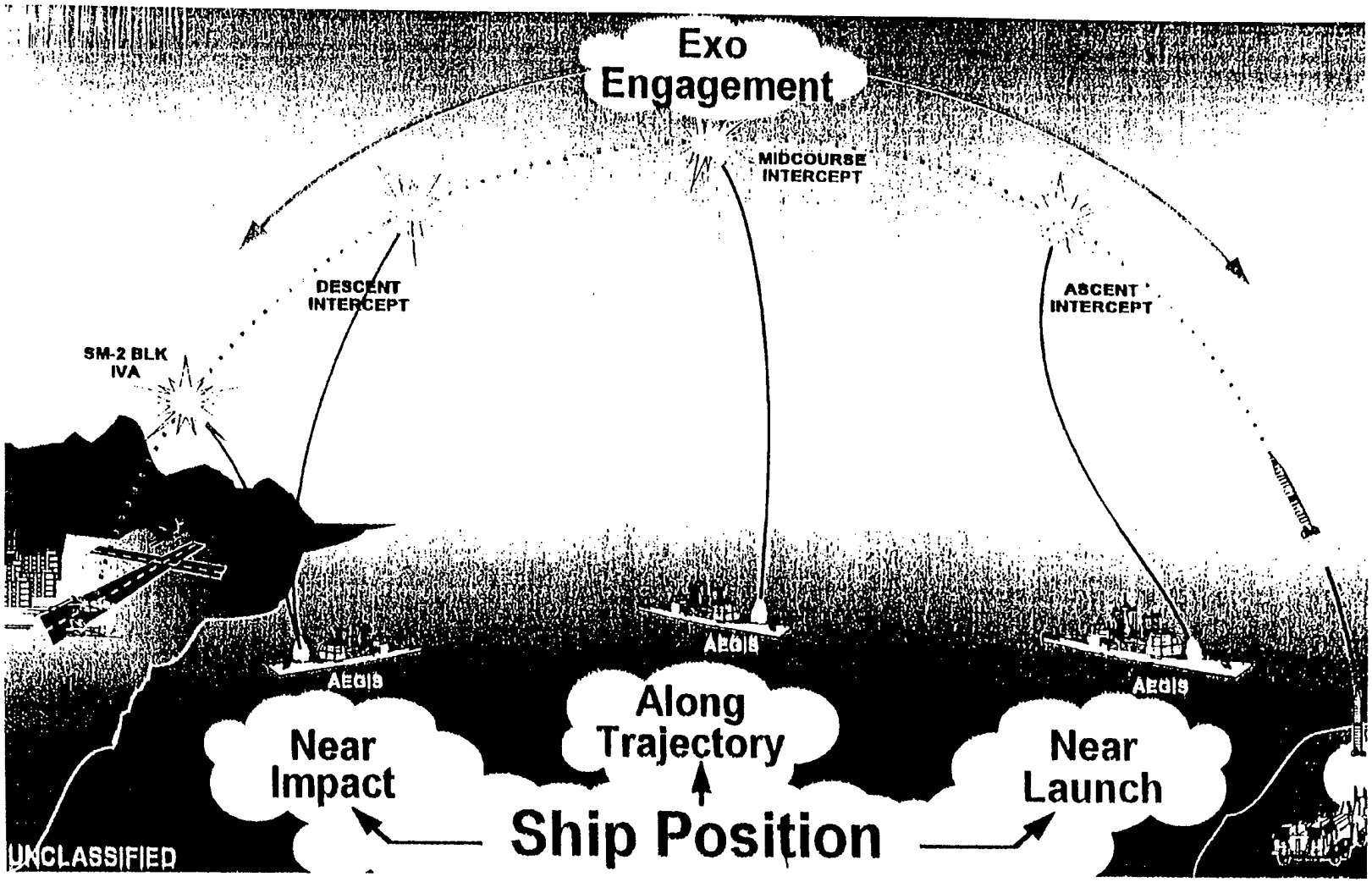


Fig. 4-2. Notional NTW-TBMD engagement. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, Navy Theater Wide TBMD Program: OIPT Review, Power Point Briefing, 14 January 1998.)

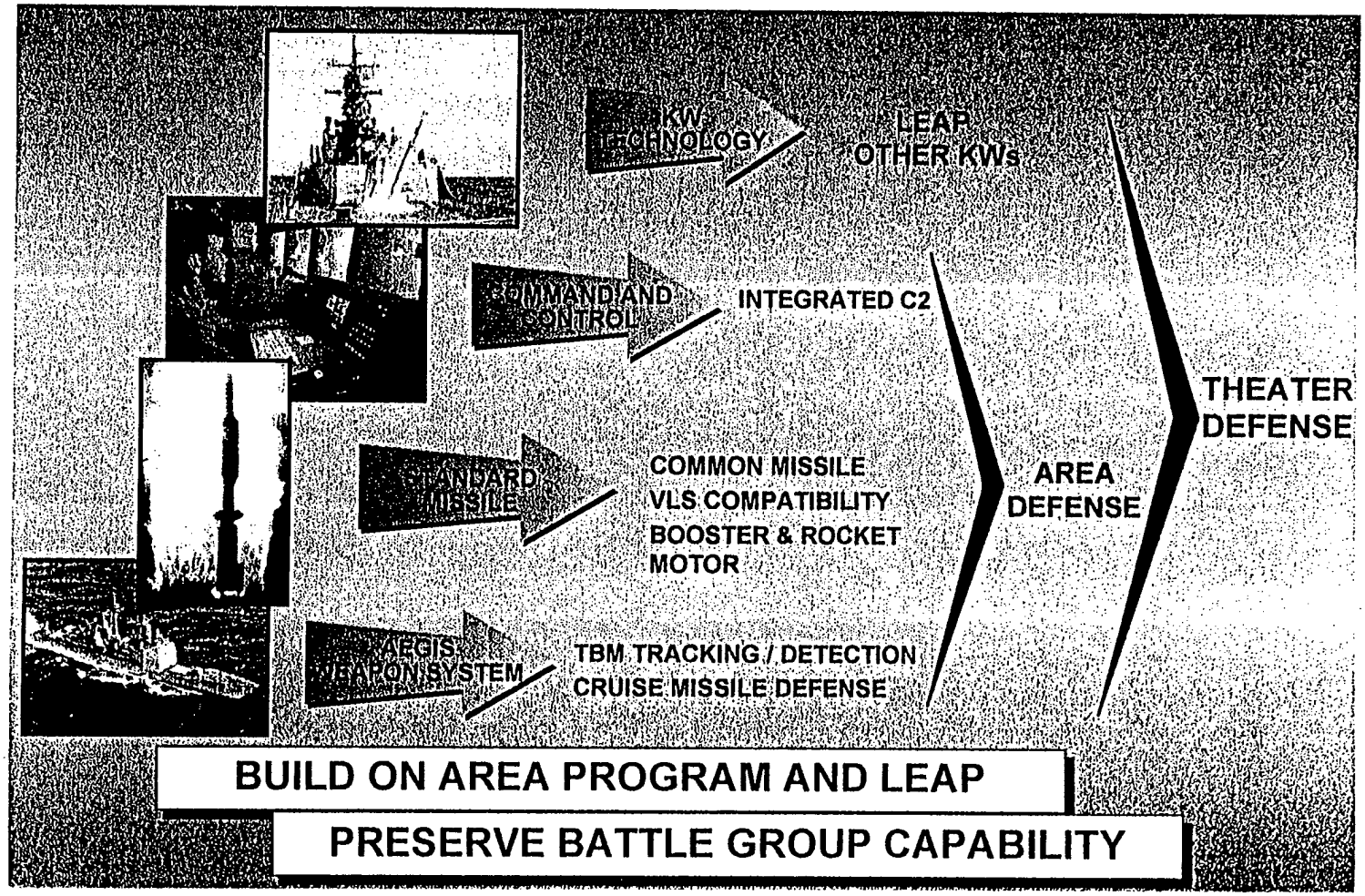


Fig. 4-3. Navy TBMD leverage. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, NTW-TBMD Preliminary Draft CARD (Rev 0), Washington, DC: DON, 31 July 1997.)

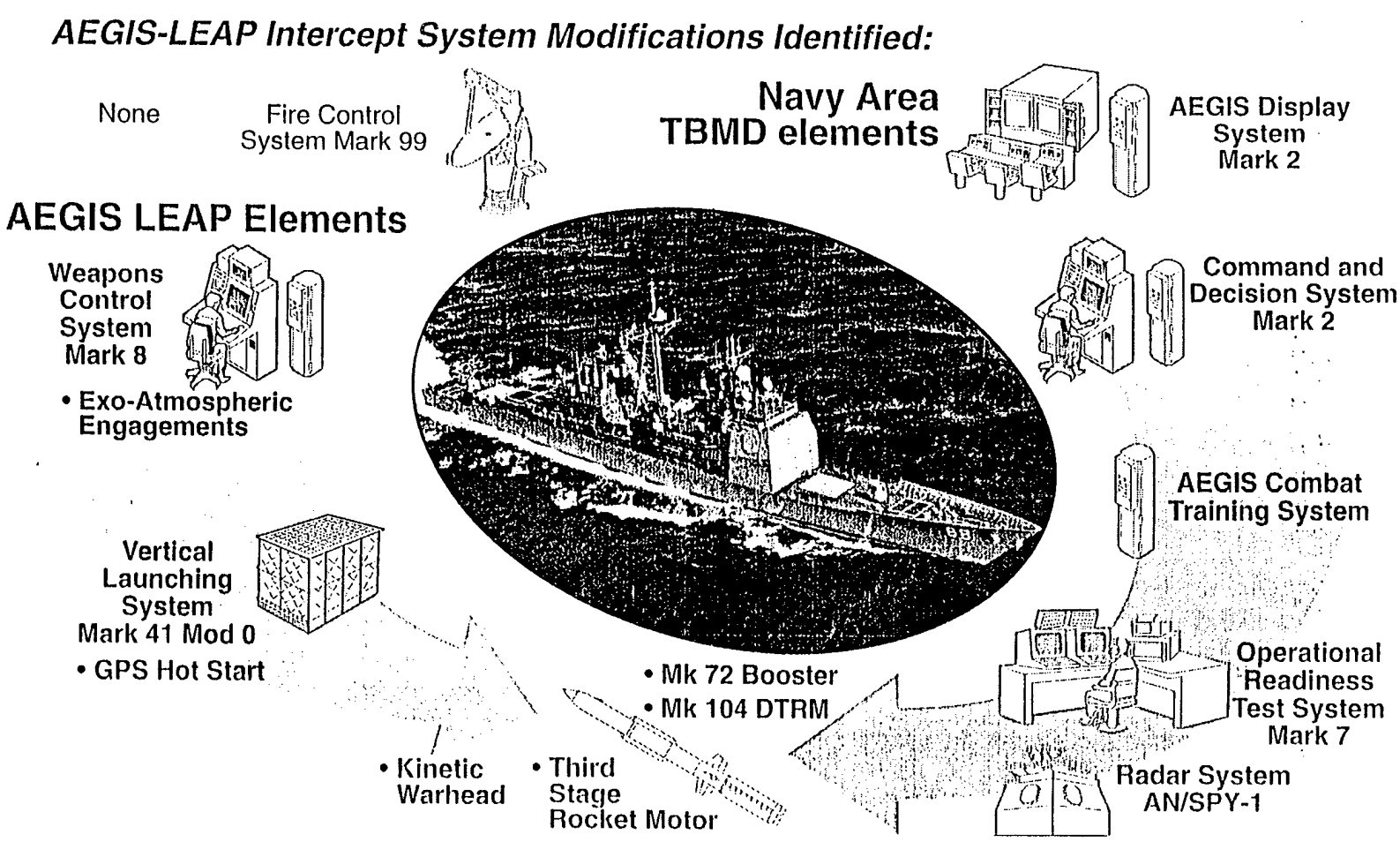
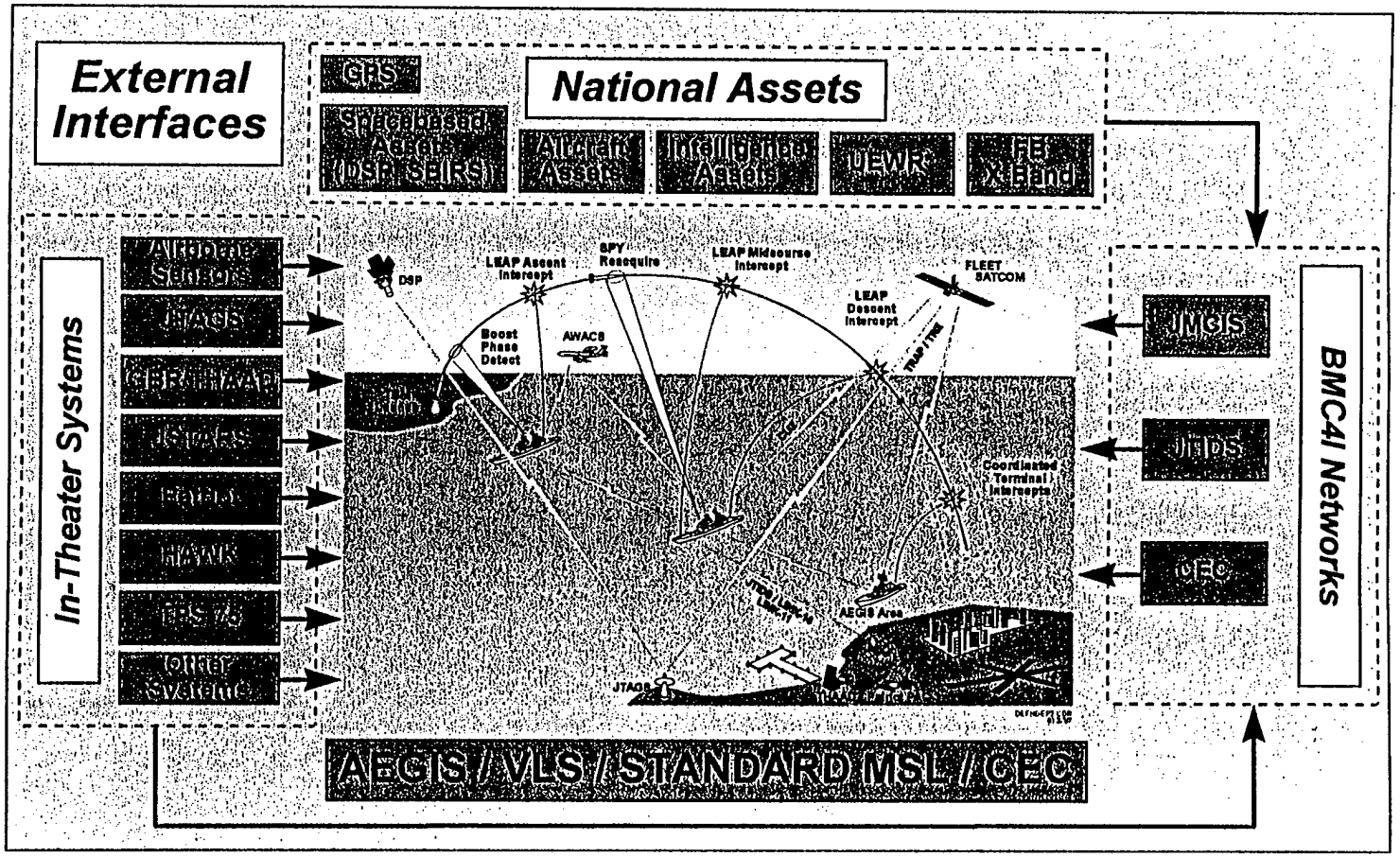


Fig. 4-4. AEGIS Weapon System evolution. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, Overview of Navy Area and Navy Theater Wide TBMD, Power Point Briefing, 23 October 1997.)



*Upgraded Early Warning Radar

Fig. 4-5. NTW-TBMD Operational Concept. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, NTW-TBMD Preliminary Draft CARD (Rev 0), 31 July 1997.)

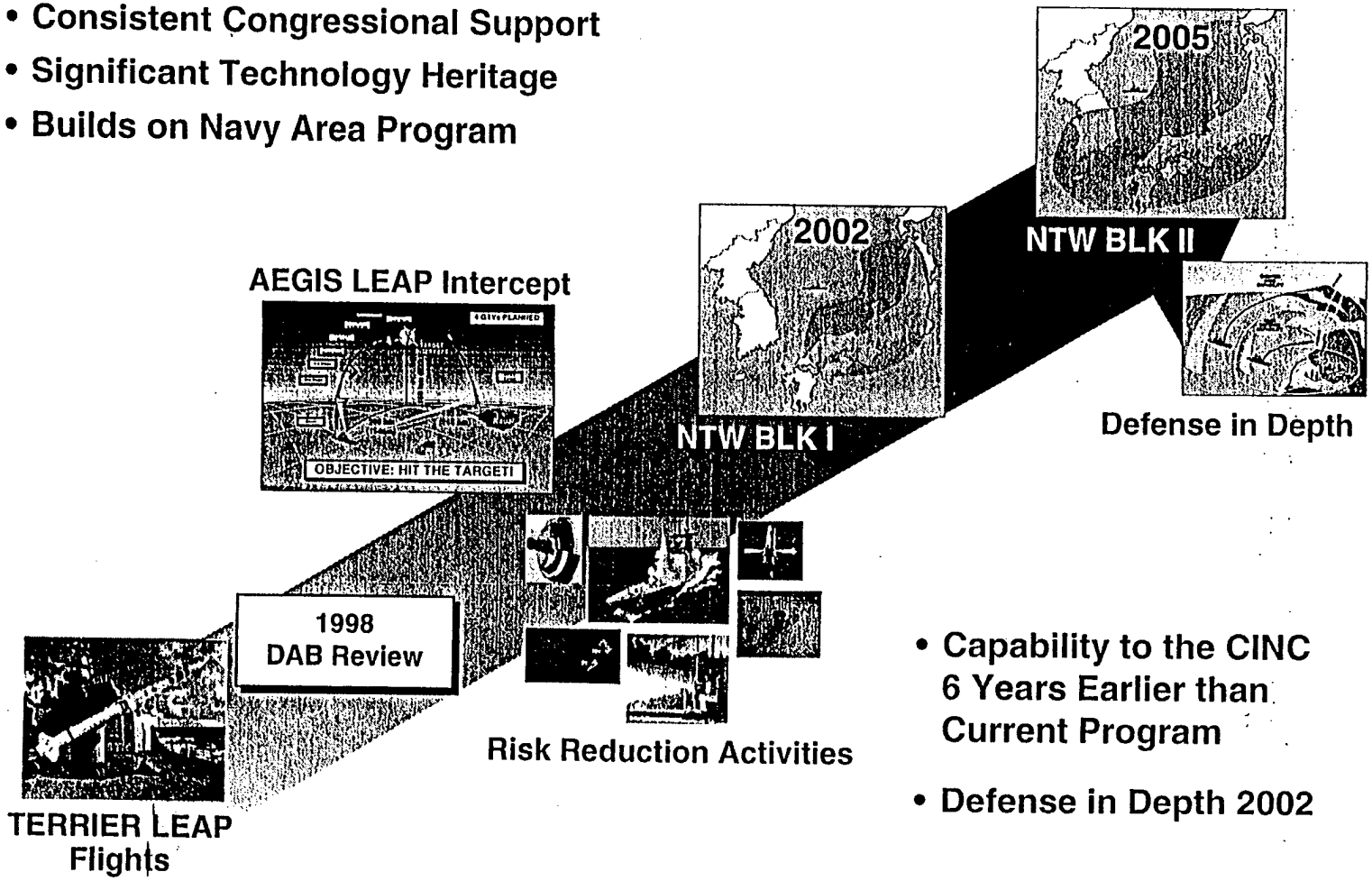


Fig. 4-6. NTW-TBMD Evolutionary Roadmap. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, Overview of Navy Area and Navy Theater Wide TBMD, Power Point Briefing, 23 October 1997.)

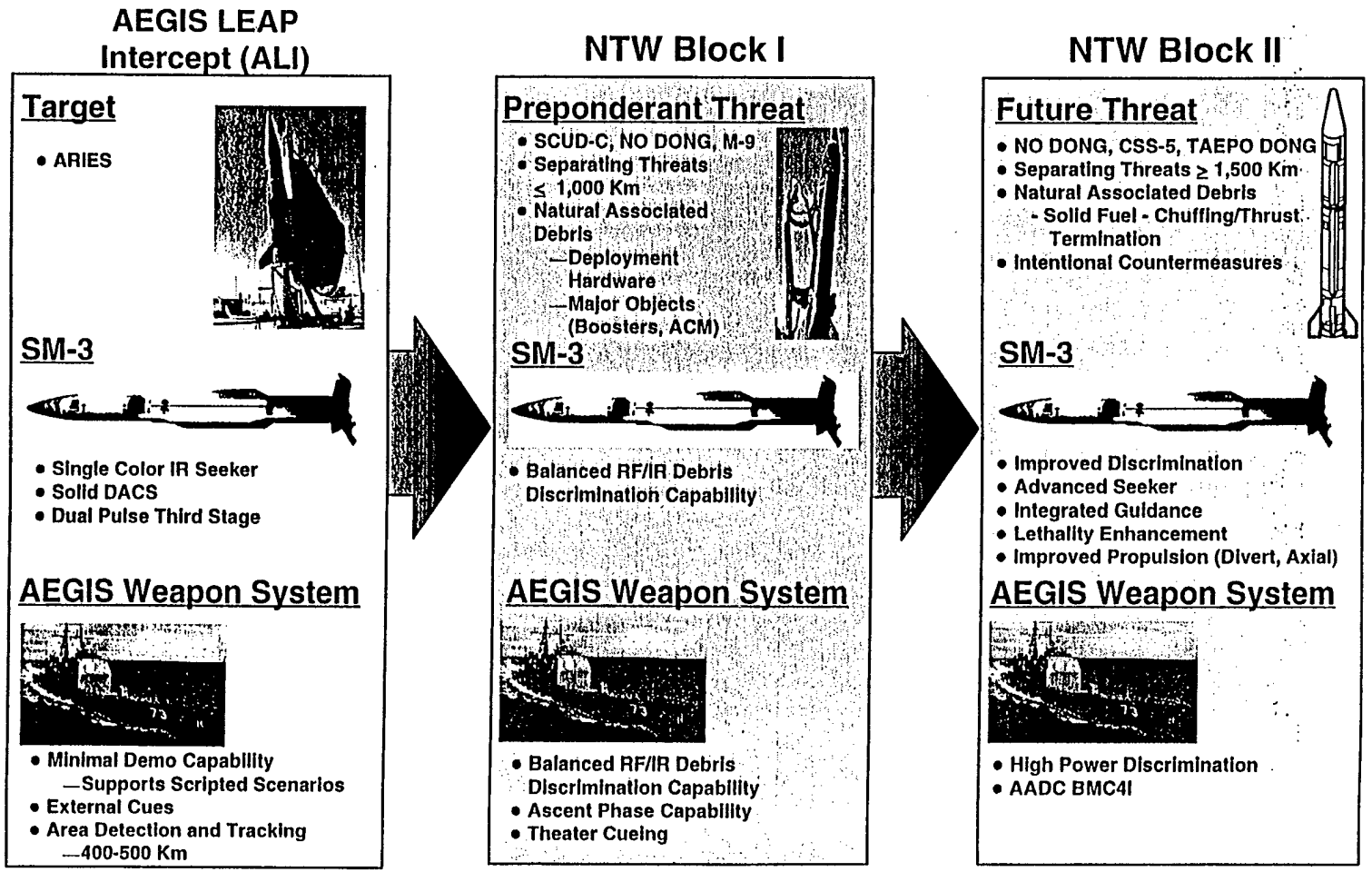


Fig. 4-7. NTW-TBMD Evolution. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, Overview of Navy Area and Navy Theater Wide TBMD, Power Point Briefing, 23 October 1997.)

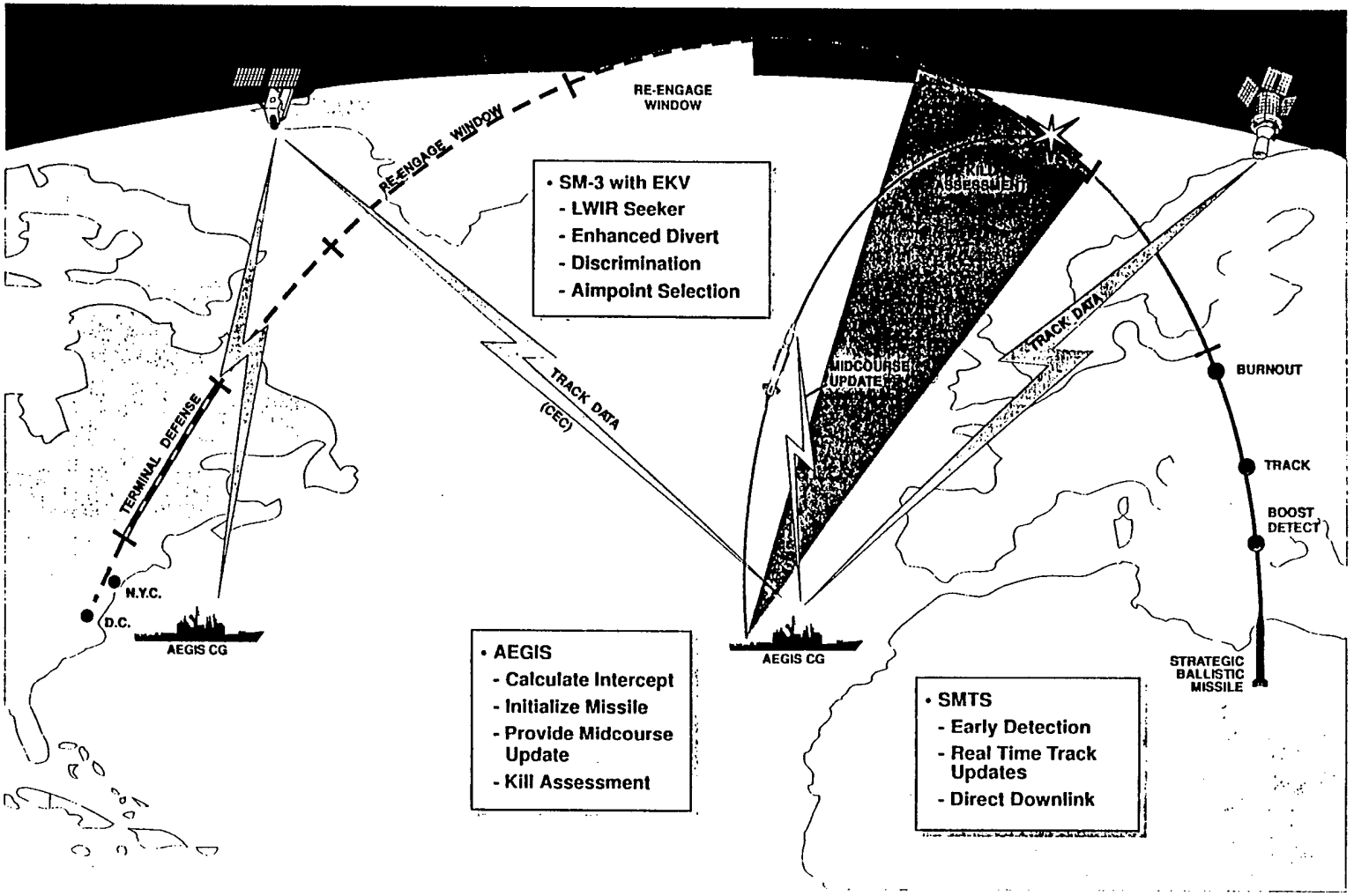


Fig. 4-8. Notional sea-based NMD engagement.

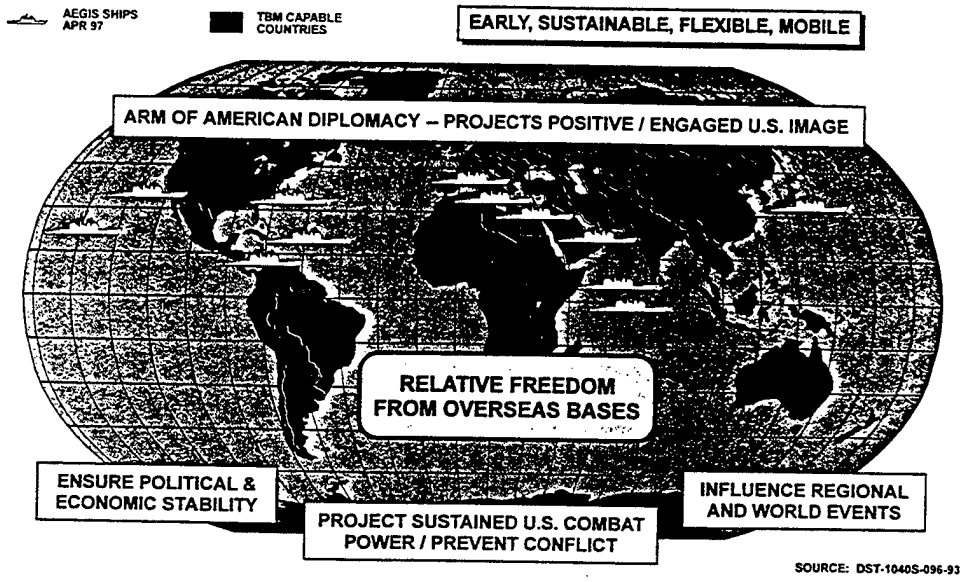


Fig. 4-9. Locations of deployed AEGIS ships in April 1997. (Reprinted from Department of the Navy, Program Executive Officer – Theater Air Defense, Navy Theater Ballistic Missile Defense: Filling an Urgent Need, September 1997.)

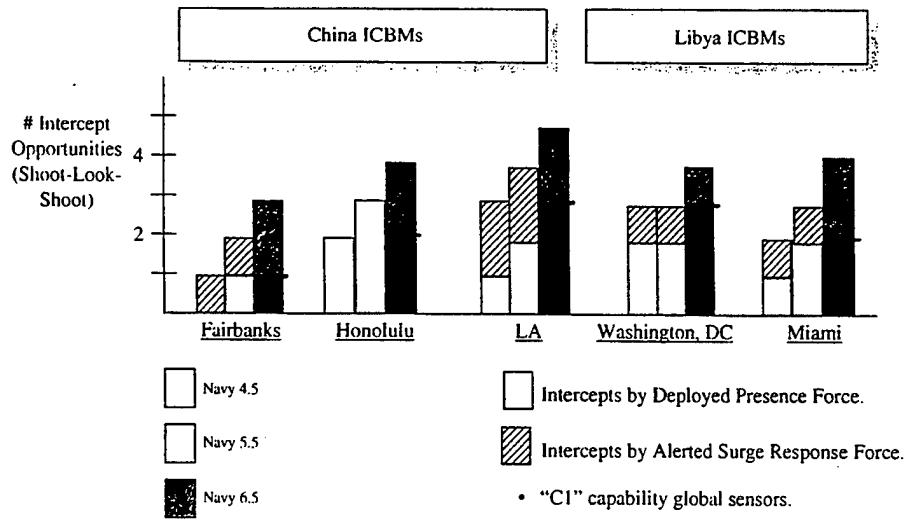


Fig. 4-10. Scenario-based sea-based ICBM intercepts comparison. (Data reprinted, with permission, from Study X.)

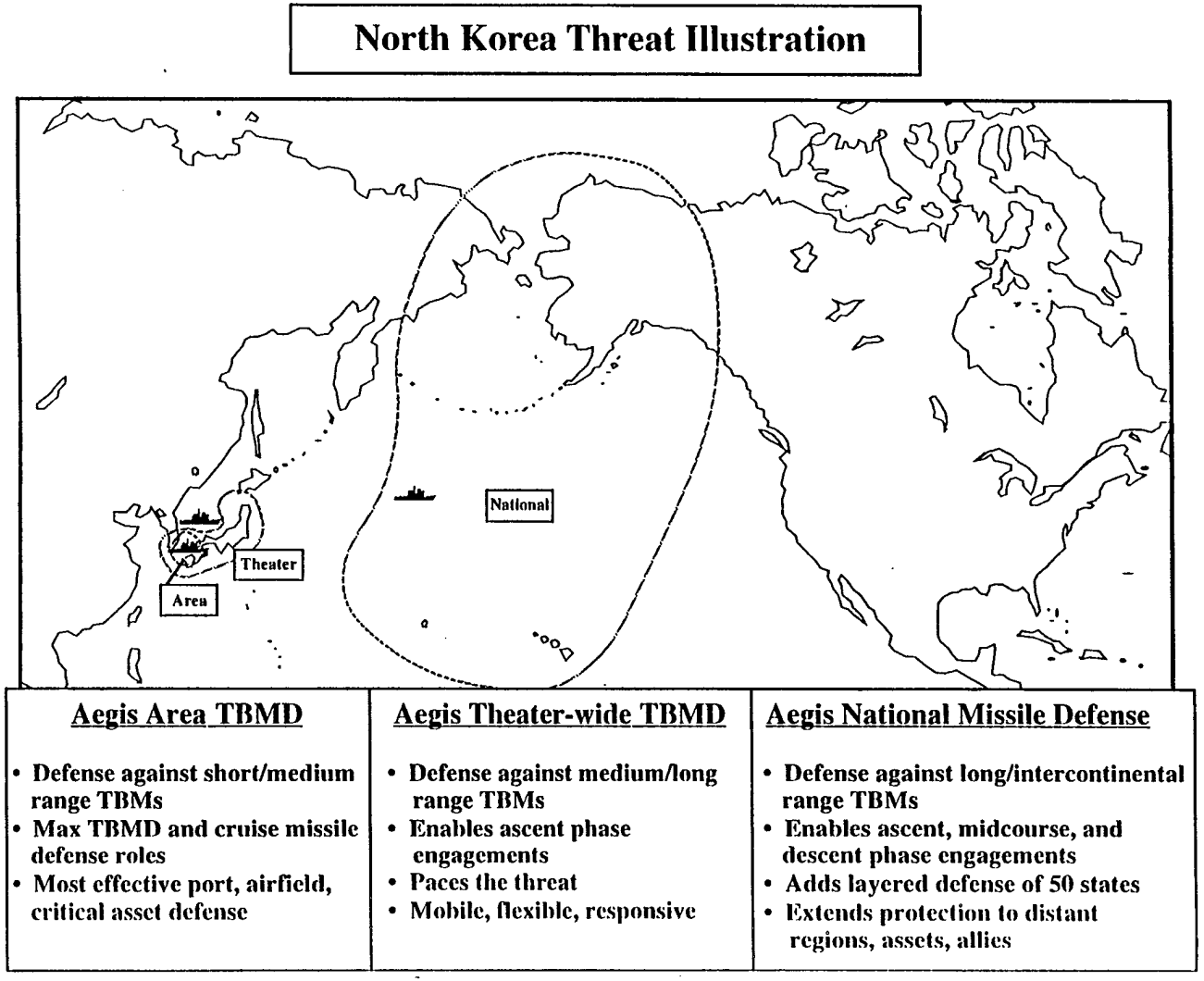


Fig. 4-11. Sea-based ballistic missile defense evolutionary deployment solution. (Reprinted, with permission, from Study X.)

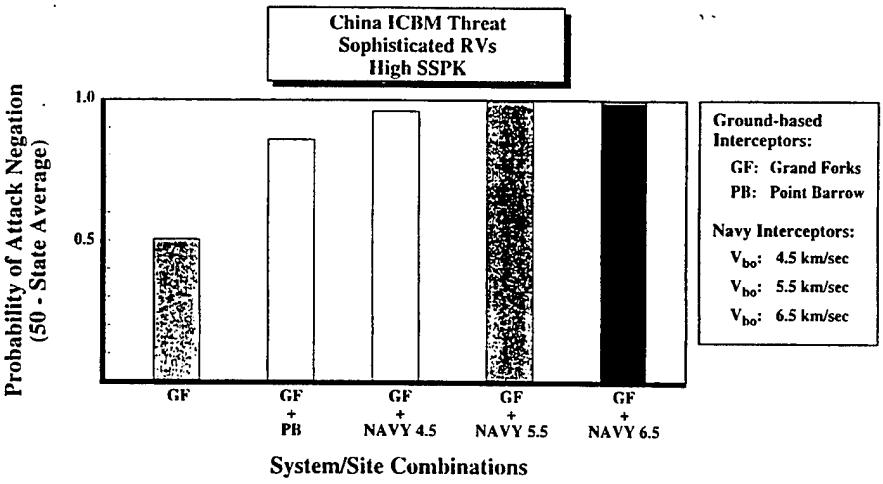


Fig. 4-12. Overall effectiveness of combined land-based NMD and sea-based NMD adjunct—high system probability of kill. (Reprinted, with permission, from Study X.)

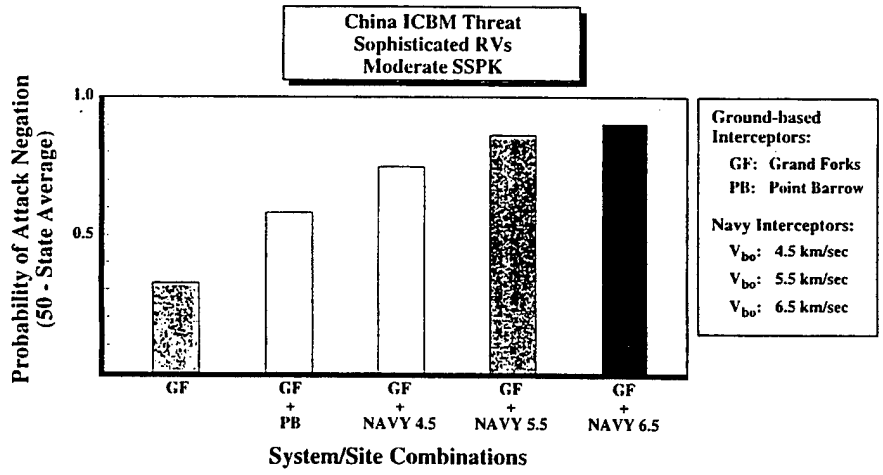


Fig. 4-13. Overall effectiveness of combined land-based NMD and sea-based NMD adjunct—moderate system probability of kill. (Data reprinted, with permission, from Study X.)

ENDNOTES

Chapter One

1. Department of State, "Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, 26 May 1972, and Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems," Art. I, 26 May 1972, 23 U.S.T. 3435, T.I.A.S. no. 7503, Summary of key provisions and full text reprinted in U.S. Arms Control and Disarmament Agency, Arms Control and Disarmament Agreements, Texts, and Histories of the Negotiations, 1996 ed., (Washington, DC: GPO, 1996), 114-120, (hereafter cited as the ABM Treaty).

2. William S. Cohen, Annual Report to the President and the Congress, William S. Cohen, Secretary of Defense, April 1997, (Washington, DC: GPO, April 1997), 217.

3. Ibid., 216-217.

4. Ibid., 217.

5. Jon P. Walman, "National Missile Defense and the Navy's Potential Solution," National Security Strategy Quarterly, summer 1997, 23-24.

6. Department of State, ABM Treaty, Art. V.

7. William S. Cohen, Annual Report to the President and the Congress, 217.

8. U.S. Department of Defense, Proliferation: Threat and Response, (Washington, DC: GPO, November 1997), 1.

9. Frank Gaffney, Jr., "What's Lacking is White House Commitment," San Diego Union-Tribune, 31 March 1997, A17.

10. U.S. Department of Defense, Proliferation: Threat and Response, November 1997, 77.

11. Ibid., 79.

12. Joseph Anselmo, "U.S. Faces Growing Arsenal of Threats," Aviation Week and Space Technology (AW&ST), 24 February 1997, 48-49.

13. Walman, 20.

14. Walman, 20, citing Jeffrey Smith, "U.N. Finds New Evidence of Iraqi Long-Range Missile Research," The Washington Post, 5 February 1997, A20.

15. Anselmo, "U.S. Faces Growing Arsenal of Threats," 45.

16. U.S. Congress, House Committee on National Security, Statement of LTG Lester Lyles, Director, Ballistic Missile Defense Organization (BMDO) before the Committee on National Security, 105th Cong., 1st sess., 5 November 1997, 1.

17. Anselmo, "U.S. Faces Growing Arsenal of Threats," 46.

18. Philip Finnegan and Steve Rodan, "Israelis Scale Back Iran Missile Estimate," Defense News, 13, no. 5 (2-8 February 1998), 8.

19. Anselmo, "U.S. Faces Growing Arsenal of Threats," 45.

20. Walman, 21.

21. Anselmo, "U.S. Faces Growing Arsenal of Threats," 46.

22. Senator Jon Kyl, "An Effective Antimissile Strategy," The Wall Street Journal, 22 May 1997.

23. Joseph Anselmo, "Russian Threat Still Massive," Aviation Week and Space Technology, 24 February 1997, 48-49.

24. Walman, 20.

25. Anselmo, "U.S. Faces Growing Arsenal of Threats," 45.

26. Ibid., 46.

27. Ibid.

28. Ibid., 46, 48-49.

29. U.S. Intelligence Community, Emerging Missile Threats to North America During the Next 15 Years, National Intelligence Estimate (NIE) 95-19, (Washington, DC: GPO, November 1995).

30. U.S. General Accounting Office, Foreign Missile Threats: Analytic Soundness of Certain National Intelligence Estimates, GAO/NSIAD-96-225, Report B-274120, (Washington, DC: GPO, August 1996), 3.

31. Walman, 23-24.

32. U.S. Congress, Senate, National Defense Authorization Act For Fiscal Year 1996, TITLE II, Subtitle C, Ballistic Missile Defense Act of 1995, Public Law 104-106, 104th Cong., 1st sess., S. 1124, 10 February 1996, Full text of Conference Report (House Report 104-450) printed in CR H351-736, Database on-line, available from Library of Congress homepage at http://thomas.loc.gov.

33. Walman, 23.

34. Anselmo, "U.S. Faces Growing Arsenal of Threats," 46.

35. U.S. Congress, House, The Defend America Act of 1996, 104th Cong., 2nd sess., H.R. 3144, 16 May 1996, Accompanied by House Report 104-583 (Part I)(CR H5287), Database on-line, available from Library of Congress homepage at http://thomas.loc.gov.

36. Ibid.

37. Ibid.

38. Ibid.

39. Walman, 24.

40. Ibid.

41. Ibid., 38.

42. Ibid., 24.

43. U.S. Congress, House, National Defense Authorization Act For Fiscal Year 1997, Public Law 104-201, 104th Cong., 2nd sess., H.R. 3230, 23 September 1996, Full text of conference report (House Report 104-724) printed in CR H8985-9368, Database on-line, available from Library of Congress homepage at http://thomas.loc.gov.

44. Walman, 25.

45. U.S. Congress, Senate, National Missile Defense Act of 1997, 105th Cong., 1st sess., S. 7, 30 April 1997, Accompanied by Senate Report 105-15 (CR S3843), Database on-line, available from Library of Congress homepage at http://thomas.loc.gov., 3.

46. Walman, 25.

47. U.S. Congress, Senate, National Missile Defense Act of 1997, 4.

48. Ibid.

49. Walman, 25.

50. U.S. Congress, Senate, National Missile Defense Act of 1997, 1.

51. Walman, 24-25.

52. Lisa Burgess and George I. Seffers, "Gansler Pledges to Field NMD," Defense News, 13, No. 9 (2-8 March 1998), 4.

53. Walman, 26.

54. Department of State, ABM Treaty, Art. III.

55. Ibid., Art. II.

56. Ibid., Art. V.

57. Walman, 26.

58. Ibid.

59. Ibid.

60. Office of the Spokesman, U.S. Department of State, ABM/TMD Agreements, START II Protocol and Letters on Early Deactivation Signed, Announcement, (Washington, DC: Department of State, 26 September 1997), 1-2.

61. Office of the Spokesman, U.S. Department of State, First Agreed Statement of September 26, 1997 Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972, (Washington, DC: Department of State, 26 September 1997), 1, (hereafter cited as the First Agreed Statement).

62. Office of the Spokesman, U.S. Department of State, Second Agreed Statement of September 26, 1997 Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972, (Washington, DC: Department of State, 26 September 1997), 1, (hereafter cited as the Second Agreed Statement).

63. Office of the Spokesman, U.S. Department of State, Joint Statement on the Annual Exchange of Information on the Status of Plans and Programs With Respect to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles,

(Washington, DC: Department of State, 26 September 1997), 1, (hereafter cited as the No Plans Statement).

64. Office of the Spokesman, U.S. Department of State, Agreement of Confidence Building Measures Related to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles, (Washington, DC: Department of State, 26 September 1997), 1, (hereafter cited as the Confidence-Building Measures Agreement).

65. Office of the Spokesman, U.S. Department of State, Memorandum of Understanding Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972, (Washington, DC: Department of State, 26 September 1997), 1, (hereafter cited as the Memorandum of Understanding on Succession).

66. U.S. Congress, House, Committee on National Security, Subcommittees on Military Research and Development and Military Procurement, Testimony of Dr. Stephen Cambone, Senior Fellow, Politica-Military Studies Program, Center for Strategic and International Studies, before a session of the House Committee on National Security, Subcommittee on Military Research and Development and Subcommittee on Military Procurement on ballistic missile defense and the ABM Treaty, 104th Cong., 2nd sess., 21 March 1996, Database on-line, Available from www.fas.org/spp/starwars/congress/ 1996_h/h960321c.htm., 2.

67. David Smith, U.S. Ambassador, ABM Treaty – Helsinki – New York, Memorandum to RADM Rodney P. Rempt, USN, Program Executive Officer – Theater Air Defense, discussing U.S. – Russia Helsinki Summit ABM Treaty agreements formalized and signed in New York, NY on 26 September 1997, 16 October 1997, 1.

68. Alan Van Tassel, Special Advisor for Political-Military Affairs, Strategic Relations Deputate, Ballistic Missile Defense Organization (BMDO), ABM/TMD Demarcation, power point briefing on U.S.—Russia Helsinki Summit ABM Treaty Agreements formalized and signed in New York, NY on 26 September 1997. Washington, DC: BMDO, 29 September 1997, 16.

69. David Smith, 1.

70. Alan Van Tassel, 16.

71. William S. Cohen, Annual Report to the President and the Congress, 217.

72. William B. Scott, "Commanders Demand Effective Missile Defense," Aviation Week and Space Technology, 3 March 1997, 43.

73. Department of State, ABM Treaty, Art. III.

74. Walman, 30.

75. Ibid.

76. Ibid., 30-31.

77. U.S. Congress, House, Committee on National Security, Subcommittees on Military Research and Development and Military Procurement, Testimony of Sidney Graybeal, former Alternate Executive Officer, U.S. Delegation to Strategic Arms Limitation Talks I (SALT-I) and first U.S. Commissioner of the Standing Consultative Commission, before a session of the House Committee on National Security, Subcommittee on Military Research and Development and Subcommittee on Military Procurement on ballistic missile defense and the ABM Treaty, 104th Cong., 2nd sess., 21 March 1996, Database on-line, Available from www.fas.org/spp/starwars/congress/1996_h/h960321d.htm., 2.

78. Ibid.

79. Lisa Burgess and George I. Seffers, 19.

80. Walman, 32.

81. Ibid.

82. Department of the Navy, Chief of Naval Information, The United States Navy: Navy Fact File, Accessed 4 April 1998, Database on-line, Available from www.chinfo.navy.mil/navpalib/factfile/ffiletop.html.

83. U.S. Congress, Senate Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, and Federal Services, The Compliance Review Process and Missile Defense: Statement of Mr. Kent G. Stansberry, Deputy Director, Arms Control Implementation and Compliance, Office of the Under Secretary of Defense for Acquisition and Technology before the Subcommittee on International Relations. 105th Cong., 1st sess., 21 July 1997.

84. Program Executive Officer-Theater Air Defense (PEO-TAD), U.S. Department of the Navy, Overview of Navy Area and Navy Theater Wide TBMD, power point briefing, (Washington, DC: PEO-TAD, 23 October 1997).

85. Walman, 27.

86. Ibid.

87. Program Executive Officer-Theater Air Defense (PEO-TAD), U.S. Department of the Navy, Navy Theater Ballistic Missile Defense (TBMD): Filling an

Urgent Need, Navy TBMD program overview, (Washington, DC: PEO-TAD, September 1997), 18.

88. Office of the Spokesman, U.S. Department of State, ABM/TMD Agreements, Announcement, 2.

Chapter Two

1. Anselmo, "U.S. Faces Growing Arsenal of Threats," 48.

2. United States General Accounting Office, National Security and International Affairs Division, Foreign Missile Threats: Analytical Soundness of Certain National Intelligence Estimates, GAO Report B-274120, ltr to House National Security Committee, (Washington DC: GAO, 30 August 1996), 3.

3. Ibid., 4.

4. U.S. Department of Defense, Proliferation: Threat and Response, (Washington, DC: GPO, April 1996), 1.

5. Ibid.

6. U.S. Department of Defense, Proliferation: Threat and Response, November 1997, iii.

7. Richard A. Holzknecht, Ballistic Missile Proliferation in the Third World: The Impact on U.S. Naval Operations, (Monterey, CA: Naval Postgraduate School, September 1990), 89.

8. Andrew W. Hull, Role of Ballistic Missiles in Third World Defense Strategies, (Alexandria, VA: Institute for Defense Analysis (IDA), June 1991), iii.

9. Ibid., 13.

10. Heritage Foundation, Defending America: Ending America's Vulnerability to Ballistic Missiles—An Update by the Missile Defense Study Team ("Team B"), Backgrounder No. 1074, (Washington, DC: The Heritage Foundation, 15 March 1996), 10.

11. William S. Cohen, Annual Report to the President and the Congress, 217.

12. K. Scott McMahon, Pursuit of the Shield: The U.S. Quest for Limited Ballistic Missile Defense, (Lanham, MD: University Press of America, 1997), 217-218.

13. Ibid., 218.

14. Ibid., 223.

15. Steven A. Padget, Issues in Space Law and Policy, (Monterey, CA: Naval Postgraduate School, December 1996), 72.

Chapter Three

1. William S. Cohen, Annual Report to the President and the Congress, 217.

2. U.S. Congress, Senate, Committee on Armed Services, Testimony of Paul G. Kaminski, Under Secretary of Defense for Acquisition and Technology before a session of the Senate Committee on Armed Services, 104th Cong., 2nd sess., 6 March 1996, Database on-line, Available from www.fas.org/spp/starwars/congress/1996_h/s960306a.htm.

3. K. Scott McMahon, Pursuit of the Shield, 223.

4. Peter S. DeRobertis, LTC, USA, Deputy for Arms Control, Office of Arms Control Implementation and Compliance, Undersecretary of Defense, Acquisition and Technology (USD A&T), Interview by author, 28 January 1998, Washington, DC.

5. Ibid.

6. Ibid.

7. Department of State, ABM Treaty, Art. II.

8. Peter S. DeRobertis.

9. United Nations, Vienna Convention on the Law of Treaties, May 23, 1969, U.N. Doc. A/Conf. 39/27, 63 A.J.I.L. 875, 1969.

10. American Law Institute, Restatement of the Law (Third), The Foreign Relations Law of the United States, § 326, 1987.

11. Keith M. Sorge, Legal Implications of United States Ballistic Missile Defense Systems, (Montreal, Quebec, Canada: Institute of Air and Space Law, McGill University, August 1995), 66.

12. Ibid., 66-67.

13. Ibid., 67.

14. Ibid.

15. Ibid.

16. U.S. Department of State, Office of the Spokesman, Bulletin: Letter of Submittal Accompanying Vienna Convention on the Law of Treaties, (Washington, DC: Department of State, 13 December 1971), 1.

17. United Nations, arts. 31, 32.

18. Sorge, 69.

19. Ibid., 69-70.

20. American Law Institute, § 325.

21. Sorge, 70.

22. Ibid., 70-71.

23. American Law Institute, § 325, Reporter's Note 5.

24. Ibid., § 325, Reporter's Note 4.

25. Sorge, 71.

26. American Law Institute, § 326, quoted in Sorge, 71.

27. Ibid., 72.

28. United States v. Stuart, 489 U.S. 353, 365-66 (1989).

29. Ibid., at 367.

30. Sorge, 72.

31. Ibid., 73.

32. Ibid., 73-74.

33. Ibid., 85, 90.

34. Department of State, ABM Treaty, Art. I.

35. Ibid., Art. III.

36. Ibid., Art. V.

37. Sorge, 86.

38. Ibid., 87.

39. Ibid., 86.

40. Ibid., 87.

41. Ibid.

42. Ibid.

43. Ibid.

44. F. S. Nyland, The ABM Treaty and National Ballistic Missile Defense Opportunities, (Idaho Springs, ID: Nyland Enterprises, May 1996), 24.

45. Sorge, 89.

46. Ibid.

47. Ibid., 91-92.

48. Department of State, ABM Treaty, Art. V.

49. John B. Rhinelander and Sherri Wasserman Goodman, *The Legal Environment*, in Defending Deterrence: Managing the ABM Treaty Regime into the 21st Century, eds. Antonia Handler Chayes and Paul Doty, (New York, NY: Pergamon-Brassey's, 1989), 47.

50. Department of State, ABM Treaty, Art. XV.

51. Ibid., Arts. XIII, XIV.

52. Ibid., Art. XV.

53. Ibid., Art. XIII.

54. Ibid.

55. Ibid., Art. XIV.

56. Sorge, 103.

57. Ibid.

58. 22 U.S.C. § 2573 (1982)

59. Department of State, ABM Treaty, Art. XV.

60. Ibid.

61. Sorge, 104-105.

62. Ibid., 104.

63. Ibid., 105.

64. American Law Institute, § 332.

65. Sorge, 106.

66. Ibid.

67. Ibid., 107.

68. Ibid., 107-108.

69. Ibid., 108.

70. Ibid.

71. Ibid.

72. Ibid.

73. Ibid., 110.

Chapter Four

1. Stanley W. Kandebo, "NMD System Integrates New and Updated Components," Aviation Week and Space Technology (AW&ST), 3 March 1997, 47.

2. Ibid.

3. U.S. Department of Defense, Ballistic Missile Defense Organization, National Missile Defense (NMD) Interceptor Booster Study, Memorandum for Distribution, 2 February 1995, 1.

4. U.S. General Accounting Office, National Missile Defense: Schedule and Technical Risks Represent Significant Development Challenges, GAO/NSIAD-98-28, Report B-275013, (Washington, DC: GPO, December 1997), 3.

5. Ibid.

6. Ibid., 5.

7. Ibid.

8. Department of the Navy, Program Executive Officer – Theater Air Defense, Navy Theater Wide Ballistic Missile Defense Preliminary Draft Cost Analysis Requirements Description (CARD)(Rev 0), (Washington, DC: DON, 31 July 1997), 1-1.

9. Program Executive Officer-Theater Air Defense (PEO-TAD), Overview of Navy Area and Navy Theater Wide TBMD.

10. Ibid.

11. Ibid., 1-11.

12. Ibid., 1-12.

13. Department of the Navy, CARD, 3-1.

14. Ibid.

15. Ibid.

16. Ibid., 3-1, 3-2.

17. Ibid., 3-2.

18. U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition and Technology (USD A&T), Evolutionary Defense Acquisition, Memorandum for Component Acquisition Executives, (Washington, DC: USD A&T, 27 January 1997), 1.

19. Ibid.

20. Program Executive Officer-Theater Air Defense (PEO-TAD), Overview of Navy Area and Navy Theater Wide TBMD.

21. Ibid.

22. Ibid.

23. Ibid.

24. Ibid.

25. Department of the Navy, "Congress Gets Look at BMDO's Idea for Navy NMD Plan," Inside the Navy, 29 April 1996, 1.

26. Ibid.

27. Department of the Navy, "Senate Wants Careful Examination of Air Force National Missile Defense Option," Inside the Navy, 15 July 1996, 1.

28. Department of the Navy, "Congress Gets Look at BMDO's Idea for Navy NMD Plan," 1.

29. Department of the Navy, Chief of Navy Information, Navy Fact File.

30. Department of the Navy, CARD, 6-1.

31. Walman, 34.

32. Ibid., 33.

33. Ibid.

34. Lisa Burgess and George I. Seffers, 19.

35. Department of Defense, "BMDO Briefs Capitol Hill on Sea-Based National Missile Defense Concept," Inside Missile Defense, 1 May 1996, 1.

36. Ibid.

37. Department of the Navy, Program Executive Officer – Theater Air Defense, Navy TBMD: Filling an Urgent Need, 10-11.

BIBLIOGRAPHY

Books

American Law Institute. Restatement of the Law (Third), The Foreign Relations Law of the United States. 1988.

Chayes, Antonia Handler and Paul Doty, eds. Defending Deterrence: Managing the ABM Treaty Regime into the 21st Century. New York, NY: Pergamon – Brassey's, 1989.

Durch, William J. The ABM Treaty and Western Security. Cambridge, MS: Ballinger, 1988.

Holmes, Kim R., ed. Defending America: A Near- and Long-Term Plan to Deploy Missile Defenses--Report of the Missile Defense Study Team. Washington, DC: The Heritage Foundation, 1995.

Lee, William T. The ABM Treaty Charade: A Study in Elite Illusion and Delusion. Washington, DC: Council for Social and Economic Studies, 1997.

McMahon, K. Scott. Pursuit of the Shield: The U.S. Quest for Limited Ballistic Missile Defense. Lanham, MD: University Press of America, 1997.

Periodicals and Articles

Anselmo, Joseph. "China's Military Seeks Great Leap Forward." Aviation Week and Space Technology, 12 May 1997, 68-72.

_____. "MEADS Faces Tough Sell." Aviation Week and Space Technology, 3 March 1997, 57.

_____. "Russian Threat Still Massive." Aviation Week and Space Technology, 24 February 1997, 48-49.

_____. "U.S. Faces Growing Arsenal of Threats." Aviation Week and Space Technology, 24 February 1997, 44-48.

Associated Press. "Rep. Weldon Angrily Ends Hearing on Missile Defense: Lawmaker Tells General, 'I Can't Trust You.'" The Washington Post, 6 November 1997, A12.

Atkinson, Peter, and Chris Gaudet. "Patriot PAC-3 Undergoes First Development Test." Defense News 12, no. 42 (20-26 October 1997), 19.

Burgess, Lisa and George I. Seffers. "Gansler Pledges to Field NMD." Defense News 13, No. 9 (2-8 March 1998), 4.

Dornheim, Michael A. "Missile Defense Design Juggles Complex Factors." Aviation Week and Space Technology, 24 February 1997, 54-56.

_____. "Missile Defense Soon, But Will It Work?" Aviation Week and Space Technology, 24 February 1997, 38-41.

_____. "THAAD Program Future Tied to Test Results." Aviation Week and Space Technology, 3 March 1997, 64-65.

_____. "'Theater Wide' Missile Defense: Appealing, Controversial, Difficult." Aviation Week and Space Technology, 3 March 1997, 62-63.

Duplantier, F. R. "ABM Treaty." Behind the Headlines. St Louis, MO: America's Future, 3 October 1995. Database on-line. Available from www.savers.org/townhall/columnists/duplantier/dupl100395.html.

_____. "Support For ABM Treaty Is Waning." Behind the Headlines. St Louis, MO: America's Future, 1 October 1995. Database on-line. Available from http://members.Accessus.net/~eamiller/af/1995/oct95/af-10-1b.html.

Editorial. "Do We Need a Missile Defense System." Washington Times, 14 May 1996.

Editorial. "The ABM Treaty." The Hindu Index, 1 February 1996. Database on-line. Available via The Hindu and The India Information homepage at www.the-hindu.com.

Erlich, Jeff. "Bill May Add $320 Million to U.S. Missile Defense Efforts." Defense News, 12, no. 44 (3-9 November 1997), 5.

Faraj, Caroline. "Troubled Economy May Crimp Iran's Defense Budget." Defense News, 13, no. 8 (23 February-1 March 1998), 12.

Ferster, Warren. "Congress Renews Push for Military Space Research Funds." Defense News, 13, no. 8 (23 February-1 March 1998), 6.

Finnegan, Philip, and Steve Rodan. "Israelis Scale Back Iran Missile Estimate." Defense News, 13, no. 5 (2-8 February 1998), 8.

Fulghum, David A. "Multi-Sensor Cobra Ball Tackles Missile Defense." Aviation Week and Space Technology, 4 August 1997, 54-55.

Goodman, Glenn W., Jr. "Unfurling A Leakproof Umbrella: Navy Theater Ballistic Missile Defense's Time Has Come." Armed Forces Journal International, April 1995, 22-25.

Gronlund, Lisbeth. "ABM: Just Kicking the Can." The Bulletin of the Atomic Scientists, January/February 1998, 15-16.

Holzer, Robert. "Navy: $800 Million Is Needed To Speed Theater-Wide System." Defense News 12, no. 42 (20-26 October 1997), 3.

Hughes, David. "Battle Management Critical For Theater-Level Defense." Aviation Week and Space Technology, 3 March 1997, 60.

_____. "JTAGS To Expedite Space-Based Warnings." Aviation Week and Space Technology, 3 March 1997, 61.

_____. "Marines Ready Hawk For Antimissile Role." Aviation Week and Space Technology, 3 March 1997, 65-66.

_____. "Navy Readies Fleet For Anti-Scud Warfare." Aviation Week and Space Technology, 24 February 1997, 61-63.

_____. "Patriot PAC-3 Upgrade Aimed at Multiple Threats." Aviation Week and Space Technology, 24 February 1997, 59-61.

Kandebo, Stanley W. "EKV Contractor Selection Targeted for Fiscal 1999." Aviation Week and Space Technology, 3 March 1997, 52-53.

_____. "NMD System Integrates New and Updated Components." Aviation Week and Space Technology, 3 March 1997, 47-51.

_____. "U.S. Pursues NMD System To Prepare for 'Rogue' Threat." Aviation Week and Space Technology, 3 March 1997, 44-45.

Kyl, Jon. "An Effective Antimissile Strategy." The Wall Street Journal, 22 May 1997.

Lamson, James, and Wyn Bowen. "'One arrow, three stars': China's MIRV programme part one." Jane's Intelligence Review, May 1997, 216-218.

Leavitt, Paul. "Capital Roundup: Missile Defense." USA Today, 6 November 1997, 14A.

Lippman, Thomas W. "Clinton, Yeltsin Agree on Broad Arms Cuts." The Washington Post, 22 March 1997, A1.

Lyles, Lester L. "U.S. Missile Defense Program Is Pivotal to National Security." National Defense, February 1997, 12-13.

Mann, Paul. "ABM Treaty at 25: Relic or Rebirth?" Aviation Week and Space Technology, 24 February 1997, 50-53.

_____. "China Alleged Top Trafficker In Mass Destruction Weapons." Aviation Week and Space Technology, 4 August 1997, 42-46.

_____. "China's Record Better, Clintonites Contend." Aviation Week and Space Technology, 4 August 1997, 46.

Morrocco, John D. "Arrow on Target for Initial Limited Capability in 1998." Aviation Week and Space Technology, 3 March 1997, 58.

_____. "Costs, Politics Impede European Efforts." Aviation Week and Space Technology, 3 March 1997, 55-57.

New York Times. "China vows to stop selling missiles to Iran, U.S. says." The Kansas City Star, 18 October 1997, A13.

Novichkov, Nikolay, and Michael A. Dornheim. "Russian SA-12, SA-10 On World ATBM Market." Aviation Week and Space Technology, 3 March 1997, 59.

Opall, Barbara. "BMDO Bows to Congress." Defense News, 13, no. 6 (9-15 February 1998), 16.

Proctor, Paul. "Boost-Phase Intercept Key to ABL Deterrent." Aviation Week and Space Technology, 3 March 1997, 67.

Review and Outlook. "What About Missile Defense?" The Wall Street Journal, 22 January 1997, A14.

Scott, William B. "Commanders Demand Effective Missile Defense." Aviation Week And Space Technology, 3 March 1997, 42-43.

_____. "Mix of Simulation, Flight Testing Troubles BMDO Leaders." Aviation Week and Space Technology, 24 February 1997, 64-67.

Smith, David. "ABM Treaty Expansion Would Entangle Missile Defense." Defense News, 12, no. 42 (20-26 October 1997), 21.

Smith, Jeffrey. "U.N. Finds New Evidence of Iraqi Long-Range Missile Research." The Washington Post, 5 February 1997, A20.

Truver, Scott C. "Tomorrow's Fleet." U.S. Naval Institute Proceedings, September 1997, 90-96.

U.S. Department of Defense. "Modernizing the Force." Defense 97, no. 4, (1997), 28-37.

_____. "Paying for the Plan." Defense 97, no. 4, (1997), 42-47.

_____. "The Global Security Environment." Defense 97, no. 4, (1997), 14-17.

U.S. Department of the Navy. "Congress Backs Development of Space Component for Navy CEC." Inside the Navy, 29 September 1997, 2.

_____. "Congress Gets Look at BMDO's Idea for Navy NMD Plan." Inside the Navy, 29 April 1996, 1.

_____. "Senate Wants Careful Examination of Air Force National Missile Defense Option." Inside the Navy, 15 July 1996, 1.

Walman, Jon P. "National Missile Defense and the Navy's Potential Solution." National Security Strategy Quarterly, summer 1997, 19-41.

Ward, Dennis. "Helsinki, Demarcation, and the Prospects for U.S.-Russian Accommodation on the Anti-Ballistic Missile Treaty." Comparative Strategy 16, Taylor & Francis, 1997, 377-384.

Government Documents

Adams, David Allan. Congressional Attitudes Toward Missile Defense: Implications for National Missile Defense from the Sea. Monterey, CA: Naval Postgraduate School, 1997.

Almeida, Rui. Probability Models for Defense Against Missile Attacks. Monterey, CA: Naval Postgraduate School, 1991.

Barrett, David K. National Missile Defense (NMD)--Has its Time Come? Carlisle Barracks, PA: Army War College, 1997.

Becker, Miriam D. Strategic Culture and Ballistic Missile Defense: Russia and the United States. Monterey, CA: Naval Postgraduate School, 1993.

Bowen, John T. The Poor Man's Air Force: Implications of the Evolving Cruise Missile Threat. Carlisle Barracks, PA: Army War College, 1997.

Cohen, William S. Annual Report to the President and the Congress, William S. Cohen, Secretary of Defense, April 1997. Washington, DC: GPO, 1997.

_____. Report of the Quadrennial Defense Review, William S. Cohen, Secretary of Defense, May 1997. Washington, DC: GPO, 1997.

Conway, Kyle W. Theater Missile Defenses and U.S. Foreign Policy. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1992.

Faggioli, Vincent J. Twixt Scilla and Charybdis: Theater Missile Defense and the ABM Treaty. Carlisle Barracks, PA: Army War College, 1996.

Fess, Kenneth E. Third World Tactical Ballistic Missiles: A Strategy for Defense. Carlisle Barracks, PA: Army War College, 1991.

Fye, Robert W. Ballistic Missile Defense--The Crux of the Matter. Carlisle Barracks, PA: Army War College, 1996.

Greenburg, James R. Theater Ballistic Missile Defense: New United States Strategic Requirements and the ABM Treaty. Monterey, CA: Naval Postgraduate School, 1995.

Harmatz, Howard I. Joint Theater Missile Defense. Carlisle Barracks, PA: Army War College, 1996.

Holzknect, Richard A. Ballistic Missile Proliferation in the Third World: The Impact on U.S. Naval Operations. Monterey, CA: Naval Postgraduate School, 1990.

Honeycutt, George H. AEGIS Vertical Launch System Loadout Model for Theater Ballistic Missile Defense. Monterey, CA: Naval Postgraduate School, 1996.

Liesveld, Rodney P. An Assessment of Strategic Defense Advocacy and Its Effect on the SDI Program: is it Time for Another Key West Conference? Washington, DC: Industrial College of the Armed Forces, 1991.

McManaway, William F. Deterrence and Strategic Defense in the 21st Century. Carlisle Barracks, PA: Army War College, 1993.

McNierney, David F., Acting Program Manager, National Missile Defense Joint Program Office. NMD Deployment Readiness Program Overview. Washington, DC: DOD, 1997.

National Security Council. A National Security Strategy for a New Century. Washington, DC: GPO, May 1997.

Padget, Steven A. Issues in Space Law and Policy. Monterey, CA: Naval Postgraduate School, 1996.

Parlier, Greg H. Counterproliferation Strategy: The Influence of Technology, Budget, and Arms Control on Theater Missile Defenses. Carlisle Barracks, PA: Army War College, 1996.

Patel, Anant, Kathrin Kjos, Felix Sasso, and Scott D. Robinson. The SM-X Flight Demonstration Program Provides the Foundation for Navy Theater-Wide Ballistic Missile Defense. Presented at AIAA/BMDO Technology Readiness Conference, 20 September 1996.

Peacock, Jerry E. The Strategic Defense Initiative in a Changing World. Carlisle Barracks, PA: Army War College, 1992.

Peterson, Joseph P. Theater Missile Defense: Beyond Patriot? Monterey, CA: Naval Postgraduate School, 1994.

Reeves, Clifford E. National Missile Defense Contingency Deployment. Maxwell AFB, AL: Air University, 1995.

Rios, Mark R. Optimizing AEGIS Ship Stationing for Active Theater Missile Defense. Monterey, CA: Naval Postgraduate School, 1993.

Shalikashvili, John M., Chairman of the Joint Chiefs of Staff. National Military Strategy of the United States of America—Shape, Respond, Prepare Now: A Military Strategy For a New Era. Washington, DC: Department of Defense, 1 September 1997.

Sorge, Keith M. Legal Implications of United States Ballistic Missile Defense Systems. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1995.

U.S. Arms Control and Disarmament Agency. ACDA 1996 Annual Report. Washington, DC: GPO, 1997. Database on-line. Available from ACDA homepage at www.acda.gov.

_____. Arms Control and Disarmament Agreements, Texts and Histories of the Negotiations, 1996 ed. Washington, DC: GPO, 1996. Summary of key provisions of *Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems*, 26 May 1972, and

Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, 3 July 1974.

U.S. Congress. House. Ballistic Missile Defense Act of 1996. 104th Cong., 2nd sess., H.R. 3489, 16 May 1996. Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. Committee on National Security. Statement of LTG Lester Lyles, Director, Ballistic Missile Defense Organization (BMDO) before the Committee on National Security. 105th Cong., 1st sess., 5 November 1997.

_____. Committee on National Security, Subcommittee on Military Research and Development and Subcommittee on Military Procurement. Testimony of Dr. Stephen Cambone, Senior Fellow, Political-Military Studies Program, Center for Strategic and International Studies before a session of the House Committee on National Security, Subcommittee on Military Research and Development and Subcommittee Military Procurement on ballistic missile defense and the ABM Treaty. 104th Cong., 2nd sess., 21 March 1996. Database on-line. Available from www.fas.org/spp/starwars/congress/1996_h/h960321c.htm.

_____. Committee on National Security, Subcommittee on Military Procurement. Opening statement of Congressman Duncan Hunter, Chairman, Military Procurement Subcommittee, House Committee on National Security at hearing on DOD modernization. 105th Cong., 2nd sess., 26 February 1998. Database on-line. Available from U.S. House of Representatives homepage at www.house.gov.

_____. Committee on National Security, Subcommittees on Military Procurement and Research and Development and Subcommittee on Military Procurement. Testimony of Sidney Graybeal before a session of the House Committee on National Security, Subcommittee on Military Research and Development and Subcommittee on Military Procurement on ballistic missile defense and the ABM Treaty. 104th Cong., 2nd sess., 21 March 1996. Database on-line. Available from www.fas.org/spp/starwars/congress/1996_h/h960321d.htm.

_____. Committee on National Security, Subcommittee on Military Research and Development. Opening statement of Congressman Curt Weldon, Chairman, Research and Development Subcommittee, House Committee on National Security at hearing on DOD modernization. 105th Cong., 2nd sess., 26 February 1998. Database on-line. Available from U.S. House of Representatives homepage at www.house.gov.

_____. Committee on National Security, Subcommittees on Military Procurement and Research and Development. Statement of Jacques S. Gansler, Under Secretary of

Defense for Acquisition and Technology before a session of the House Committee on National Security, Subcommittees on Procurement and Research and Development on Acquisition and Technology Overview. 105th Cong., 2nd sess., 26 February 1998. Database on-line. Available from www.acq.osd.mil/ousda/testimonies/hnsc_redraft.html.

_____. Committee on National Security, Subcommittees on Military Procurement and Research and Development and Subcommittee on Military Procurement. Testimony of Sidney Graybeal before a session of the House Committee on National Security, Subcommittee on Military Research and Development and Subcommittee on Military Procurement on ballistic missile defense and the ABM Treaty. 104th Cong., 2nd sess., 21 March 1996. Database on-line. Available from www.fas.org/spp/starwars/congress/1996_h/h960321d.htm.

_____. Defend America Act of 1996. 104th Cong., 2nd sess., H.R. 3144, 16 May 1996. Accompanied by House Report 104-583. Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. Defense Department FY97 Appropriations Bill, Public Law 104-208. 104th Cong., 2nd sess., H.R. 3610, 30 September 1996. Accompanied by Conference Report H. Rept. 104-863 (CR H11644-12021). Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. Department of Defense Appropriations Act, 1998, Public Law 105-56. 105th Cong., 1st sess., H.R. 2266, 8 October 1997. Accompanied by Conference Report H. Rept. 105-265 (CR H7656-7710). Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: publ56.105.

_____. Department of Defense Appropriations Act, 1996, Public Law 104-61. 104th Cong., 1st sess., H.R. 2126, 1 December 1995, unsigned by President. Accompanied by Conference Report H. Rept. 104-344 (CR H12415-12427). Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. Iran Missile Proliferation Sanctions Act of 1997. 105th Cong., 1st sess., H.R. 2709, 23 October 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: h2709ih.txt.

_____. Iran Missile Proliferation Sanctions Act of 1997: Report of the Committee on International Relations, House of Representatives on H.R. 2709 With Additional Views, Report 105-375. 105th Cong., 1st sess., 4 November 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: hr375.105.

_____. National Defense Authorization Act for Fiscal Year 1996, TITLE II, Subtitle C, Ballistic Missile Defense Act of 1995, Public Law 104-406. 104th Cong., 1st sess., H.R. 406, 10 February 1996. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: hr406.104.

_____. National Defense Authorization Act for FY 1996. 104th Cong., 1st sess., H.R. 1530, 28 December 1995, bill vetoed by President. Accompanied by Conference Report H. Rept. 104-406 (CR H14378-14761). Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. National Defense Authorization Act for Fiscal Year 1997, Public Law 104-201. 104th Cong., 2nd sess., H.R. 3230, 23 September 1996. Accompanied by Conference Report H. Rept. 104-724 (CR H8985-9368). Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: h3230rh.txt.

_____. National Defense Authorization Act for Fiscal Year 1998, Public Law 105-85. 105th Cong., 1st sess., H.R. 1119, 18 November 1997. Accompanied by Conference Report H. Rept. 105-340 (CR H9076-9464). Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. National Security Revitalization Act. 104th Cong., 1st sess., H.R. 7, 16 February 1995. Accompanied by House Report 104-18. Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. United States-Taiwan Anti-Ballistic Missile Defense Cooperation Act: Report of the Committee on International Relations, House of Representatives on H.R. 2386 With Dissenting Views, Report 105-308. 105th Cong., 1st sess., 6 October 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: hr308p1.105.

U.S. Congress. Senate. Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, and Federal Services. Missile Defense and Compliance Review: Hearing before the Subcommittee on International Relations. 105th Cong., 1st sess., 21 July 1997.

_____. Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, and Federal Services. The Compliance Review Process and Missile Defense: Opening remarks of Senator Thad Cochran before the Subcommittee on International Relations. 105th Cong., 1st sess., 21 July 1997.

_____. Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, and Federal Services. The Compliance Review Process and Missile Defense: Statement of Mr. Kent G. Stansberry, Deputy Director, Arms Control Implementation and Compliance, Office of the Under Secretary of Defense for

Acquisition and Technology before the Subcommittee on International Relations. 105th Cong., 1st sess., 21 July 1997.

_____. Concurrent Resolution. 105th Cong., 1st sess., S. CON. RES. 48, 4 November 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: sc48rs.txt.

_____. Defend America Act of 1996. 104th Cong., 2nd sess., S.1635RS (CR S2651-2653), 21 March 1996. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: s1635rs.txt.

_____. Defend the United States of America Act of 1997. 105th Cong., 1st sess., S. 64, 21 January 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: s64is.txt.

_____. Department of Defense Authorization Act for FY 1996, Public Law 104-106, 104th Cong., 1st sess., S. 1124, 10 February 1996. Accompanied by Conference Report H. Rept. 104-450 (CR H351-736). Database on-line. Available from Library of Congress homepage at http://thomas.loc.gov.

_____. Missile Defense: Statement of Senator Inhofe before the Senate. 104th Cong., 2nd sess. Congressional Record, 142, no. 83, daily ed. (7 June 1996): S5971-S5972.

_____. National Missile Defense Act of 1997. 105th Cong., 1st sess., S. 7, 30 April 1997. Accompanied by Senate Report 105-15 (CR S235). Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: s7ix.txt.

_____. National Missile Defense Act of 1997: Report of the Senate Committee on Armed Services on S. 7 With Additional and Minority Views, Report 105-15. 105th Cong., 1st sess., 30 April 1997. Database on-line. Available from University of California, Berkeley GPO Gate, DOCID: f: sr015.105.

U.S. Department of Defense. Department of Defense Report to Congress—Domestic Preparedness Program in the Defense Against Weapons of Mass Destruction. Washington, DC: GPO, 1 May 1997.

_____. Department of Defense Report to Congress on Navy Theater Wide Defense System (Formerly Navy Upper Tier). Washington, DC: DOD, 25 March 1996.

_____. Proliferation: Threat and Response. Washington, DC: GPO, November 1997.

U.S. Department of Defense, Ballistic Missile Defense Organization (BMDO). BMDO External Affairs Digest. Washington, DC: BMDO, 1 October 1997.

_____. BMDO External Affairs Digest. Washington, DC: BMDO, 30 January 1998.

U.S. Department of Defense, Under Secretary of Defense, Acquisition and Technology USD (A&T). Draft Navy Theater Wide Theater Ballistic Missile Defense (TBMD) Single Acquisition Management Plan (SAMP). Washington, DC: DOD, 6 November 1997.

U.S. Department of the Navy, Program Executive Office-Theater Air Defense (PEO-TAD). Navy Theater Ballistic Missile Defense (TBMD): Filling an Urgent Need, Navy TBMD Program Overview. Washington, DC: PEO-TAD, September 1997.

_____. Navy Theater Wide Ballistic Missile Defense Preliminary Draft Cost Analysis Requirements Description (CARD)(Rev 0). Washington, DC: DON, 31 July 1997.

U.S. General Accounting Office. Foreign Missile Threats: Analytic Soundness of Certain National Intelligence Estimates, GAO/NSIAD-96-225, Report B-274120. Washington, DC: GPO, August 1996.

U.S. General Accounting Office. National Missile Defense: Schedule and Technical Risks Represent Significant Development Challenges, GAO/NSIAD-98-28, Report B-275013. Washington, DC: GPO, December 1997.

Walker, James A., Frances Martin, and Sharon S. Watkins. Strategic Defense: Four Decades of Progress. Huntsville, AL: Historical Office, U.S. Army Space and Strategic Defense Command, 1995.

Williams, David C. Optimally Selecting Ballistic Missile Defense Organization Project Alternatives. Monterey, CA: Naval Postgraduate School, 1993.

Unpublished Materials

Armenian, H.K., J.D. Collier, P.W. Dennis, B.J. Simon, and M. Yin. "TMD Defense Planning." Agoura Hills, CA: Litton Systems, Inc., Data Systems Division, 1996.

Center for Security Policy. "Well Done, Weldon: Senior Legislator Refuses to Accept Factually Incorrect 'Political Correctness' From Gen. Lyles," Decision Brief No. 97-D 167. Washington, DC: The Center for Security Policy, 6 November 1997.

Heritage Foundation. "Defending America: Ending America's Vulnerability to Ballistic Missiles—An Update by the Missile Defense Study Team ("Team B"),"

Backgrounder No. 1074. Washington, DC: The Heritage Foundation, 15 March 1996.

Holmes, Kim R. and Baker Spring. "Clinton's ABM Treaty Muddle," Committee Brief No. 16. Washington, DC: The Heritage Foundation, 7 July 1995.

Moore, Thomas. "The Missile Defense Act of 1995: The Senate's Historic Opportunity," Executive Memorandum #423. Washington, DC: The Heritage Foundation, 1 August 1995.

Moore, Thomas, and Baker Spring. "The Senate's Right to Approve ABM Treaty Changes Must be Upheld," Executive Memorandum #479. Washington, DC: The Heritage Foundation, 12 May 1997.

Nyland, F.S. "The ABM Treaty and National Ballistic Missile Defense Opportunities," R-117-ACDA. Idaho Springs, CO: Nyland Enterprises, May 1996.

Spring, Baker. "Alaska's Missile Defense Appeal: A Model For Other States," Backgrounder No. 1136. Washington, DC: The Heritage Foundation, 8 September 1997.

_____. "The Arms Control Spree at the Helsinki Summit," Executive Memorandum #479. Washington, DC: The Heritage Foundation, 27 March 1997.

_____. "The House-Senate Conference Should Agree to Rapid Deployment of Missile Defenses," Backgrounder No. 1054. Washington, DC: The Heritage Foundation, 21 September 1995.

_____. "The Senate Should Block the White House's End Run on the ABM Treaty," Backgrounder No. 1106. Washington, DC: The Heritage Foundation, 11 March 1996.

Stimson Center. "S.1124: National Defense Authorization Act for Fiscal Year 1996 Signed by the President on February 10, 1996, Title II, Subtitle C, Ballistic Missile Defense Act of 1995," The Nuclear Roundtable Background Document. Washington, DC: The Stimson Center, February 1996.

U.S. Department of the Navy, Program Executive Office-Theater Air Defense (PEO-TAD). "Draft FY 1997 Congressional Language Summary With Accompanying Notes," Navy Theater Air Defense Programs. Washington, DC: PEO-TAD, October 1996.

Other Sources

Albright, Madeleine K. U.S. Secretary of State, to Yevgeniy Maksimovich Primakov, Minister of Foreign Affairs of the Russian Federation, 26 September 1997. Washington, DC: Department of State.

Blackwill, Robert D., and Keith W. Dayton. Arms Control and the U.S. – Russian Relationship: Problems, Prospects, and Prescriptions, Report of an Independent Task Force. New York, NY: Council on Foreign Relations, Inc., 1996. Database on-line. Available from www.fas.org/spp/eprint/cfr_ncpf.htm.

DeRobertis, Peter S., LTC, USA, Deputy for Arms Control, Office of Arms Control Implementation and Compliance, Undersecretary of Defense, Acquisition and Technology (USD A&T). Interview by author, 28 January 1998, Washington, DC. Notes. Office of Arms Control Implementation and Compliance, USD A&T office, Washington, DC.

Hiser, Kenyon J., Ballistic Missile Defense Organization (BMDO). E-mail summary of meeting between Mr. Sokol and Dr. Stansberry concerning Navy Area TBMD Certification. 31 October 1997.

Holum, John D., Director, U.S. Arms Control and Disarmament Agency (ACDA) and Acting Under Secretary of State for Arms Control and International Security Affairs. Remarks to the Business Executives for National Security, and the New York Academy of Sciences, New York City. 22 January 1998. Database on-line. Available from ACDA homepage at www.acda.gov/speeches/holum/nyc.htm.

McKinley, Dave, and Joel Schwendemann. Joint Composite Tracking Network (JCTN) Study Report, Memorandum for the Record. 3 October 1997.

O'Neill, June E., Director, Congressional Budget Office. Letter to Senator J. James Exon, Ranking Member, Committee on the Budget, U.S. Senate discussing the cost estimate for deploying the national missile defense system proposed in the Defend America Act of 1996 (S. 1635) and ABM Treaty compliance issues concerning the proposed system, 30 May 1996. Database on-line. Available at www.fas.org/spp/starwars/congress/1996_r/cboabmt.htm.

Payne, Keith, Dr., National Institute of Public Policy (NIPP). Memorandum summary of and insights concerning recent US/Russian TBMD Study Group meetings. 7 October 1997.

Perez, Samuel, CDR, USN, Navy Theater Wide (NTW) Tactical Ballistic Missile Defense (TBMD) Program Office (PMS-452C). Interview by author, 6-7 November 1997, Washington, DC. Notes. NTW-TBMD program office, Washington, DC.

Pike, John, Director of the Space Policy Project, Federation of American Scientists. The Role of the ABM Treaty and National Missile Defense, presentation to Panel III at the Carnegie Endowment Conference on START II, Missile Non-Proliferation, and Missile Defense: Seminar Overview, February 1996. Database on-line. Available at www.fas.org/spp/starwars/analysis/jp960200.htm.

Primakov, Yevgeniy Maksimovich, Minister of Foreign Affairs of the Russian Federation. Letter to Madeleine K. Albright, U.S. Secretary of State, 26 September 1997. Washington, DC: Department of State.

Rempt, Rodney P., Navy Program Executive Officer-Theater Air Defense (PEO-TAD). Getting Theater Ballistic Missile Defense to Sea. Power Point Briefing. Washington, DC: PEO-TAD, 1997.

_____. Navy Theater Ballistic Missile Defense Program. Power Point Briefing to BG Richard Davis, USAF. Washington, DC: PEO-TAD, 26 September 1997.

Schnurrpusch, Gary W., Systems Planning and Analysis (SPA), Inc. Interview by author. 29 January 1998, Alexandria, VA. Notes. SPA Office, Alexandria, VA.

Russian Federation, Ministry of Foreign Affairs. Statement by the Russian Federation on Plans With Respect to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles, Official Statement. Washington, DC: Department of State, 26 September 1997.

Smith, David, U.S. Ambassador. ABM Treaty – Helsinki – New York, Memorandum to RADM Rodney P. Rempt, USN, Program Executive Officer-Theater Air Defense, discussing U.S.—Russia Helsinki Summit ABM Treaty agreements formalized and signed in New York, NY on 26 September 1997. 16 October 1997.

Tassel, Alan Van, Special Advisor for Political-Military Affairs, Strategic Relations Deputate, Ballistic Missile Defense Organization (BMDO). ABM/TMD Demarcation, Power Point Briefing on U.S.—Russia Helsinki Summit ABM Treaty agreements formalized and signed in New York, NY on 26 September 1997. Washington, DC: BMDO, 29 September 1997.

United Nations. Vienna Convention on the Law of Treaties, May 23, 1969. U.N. Doc. A/Conf. 39/27, 63 A.J.I.L. 875, 1969. Database on-line. Available at www.Greenpeace.org/~intlaw/vien-tr.html.

United States v. Stuart. 489 U.S. 353, 365-66 (1989).

U.S. Department of Defense, Ballistic Missile Defense Organization (BMDO). National Missile Defense Architecture, Memorandum for Distribution. Washington, DC: BMDO, 23 June 1995.

_____. Fiscal Year 1997 TBMD Plus-up Funding Priorities, Response to Congressional Request for Information. Washington, DC: BMDO, 5 June 1996.

_____. Navy Theater Wide Fiscal Year 1998 Plus-up Planning, Memorandum for Program Executive Officer for Theater Air Defense. Washington, DC: BMDO, 15 October 1997.

U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition and Technology (USD A&T). Evolutionary Defense Acquisition, Memorandum for Component Acquisition Executives. Washington, DC: USD A&T, 27 January 1997.

_____. Overarching Integrated Product Team (OIPT) Meeting on the Navy Theater Wide (NTW) Program – January 14, 1998, Memorandum for Distribution. Washington, DC: USD A&T, 25 January 1998.

U.S. Department of the Navy, Office of the Secretary. Accelerated Deployment of Navy Theater Ballistic Missile Defense Systems, Memorandum for the Assistant Secretary Of the Navy (Research, Development and Acquisition) and Deputy Chief of Naval Operations (Resources, Warfare Requirements and Assessments). Washington, DC: Office of the Secretary, 29 October 1996.

U. S. Department of the Navy, Program Executive Office-Theater Air Defense (PEO-TAD). Navy Theater Wide Cooperation. Power Point Briefing. Washington, DC: PEO-TAD, 23 October 1997.

_____. Overview of Navy Area and Navy Theater Wide TBMD. Power Point Briefing. Washington, DC: PEO-TAD, 23 October 1997.

_____. Navy Theater Wide TBMD Program: OIPT Review. Power Point Briefing. Washington, DC: PEO-TAD, 14 January 1998.

U.S. Department of State, Office of the Spokesman. ABM/TMD Agreements, START II Protocol and Letters on Early Deactivation Signed, Announcement. Washington, DC: Department of State, 26 September 1997.

_____. Agreement On Confidence-Building Measures Related to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles. Washington, DC: Department of State, 26 September 1997.

_____. Agreement On Confidence-Building Measures, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Arms Control and Nonproliferation: The Clinton Administration Record, Department of State Fact Sheet. Washington, DC: Department of State, 20 May 1996.

_____. Background Briefing by Senior Administration Officials on Arms Control, Department of State Press Release. Washington, DC: Department of State, 26 September 1997.

_____. Bulletin: Letter of Submittal Accompanying Vienna Convention on the Law of Treaties. Washington, DC: Department of State, 13 December 1971.

_____. Common Understandings Related to the First Agreed Statement of September 26, 1997, Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972. Washington, DC: Department of State, 26 September 1997.

_____. Common Understandings Related to the Second Agreed Statement of September 26, 1997, Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972. Washington, DC: Department of State, 26 September 1997.

_____. Commonly Asked Questions on the Missile Technology Control Regime (MTCR), Department of State Fact Sheet. Washington, DC: Department of State, 26 November 1997.

_____. Communique of the US-USSR Standing Consultative Commission on the Review of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972, Department of State Fact Sheet. Washington, DC: Department of State, 21 November 1977.

_____. Communique of the US-USSR Standing Consultative Commission on the Second Review of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, Department of State Fact Sheet. Washington, DC: Department of State, 15 December 1982.

_____. Excerpts From Presidential Speeches on Arms Control, Department of State Fact Sheet. Washington, DC: Department of State, 14 June 1996.

_____. First Agreed Statement of September 26, 1997 Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the

Limitation of Anti-Ballistic Missile Systems of May 26, 1972. Washington, DC: Department of State, 26 September 1997.

_____. First Agreed Statement of September 26, 1997, Relating to the ABM Treaty, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Joint Communique: Fourth Review of the Anti-Ballistic Missile (ABM) Treaty, Department of State Fact Sheet. Washington, DC: Department of State, 1 October 1993.

_____. Joint Statement Concerning the ABM Treaty, Department of State Fact Sheet. Washington, DC: Department of State, 21 March 1997.

_____. Joint Statement on the Annual Exchange of Information on the Status of Plans and Programs With Respect to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles. Washington, DC: Department of State, 26 September 1997.

_____. Memorandum of Understanding Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972. Washington, DC: Department of State, 26 September 1997.

_____. Memorandum of Understanding on Succession, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Protocol to the Treaty Between the United States of America and the Russian Federation to Further Reduction and Limitation of Strategic Offensive Arms of January 1993. Washington, DC: Department of State, 26 September 1997.

_____. Regulations of the Standing Consultative Commission. Washington, DC: Department of State, 26 September 1997.

_____. Regulations of the Standing Consultative Commission, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Remarks by Secretary of State Madeleine K. Albright at Anti-Ballistic Missile Treaty Signing, Announcement. Washington, DC: Department of State, 26 September 1997.

_____. Second Agreed Statement of September 26, 1997, Relating to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972. Washington, DC: Department of State, 26 September 1997.

_____. Second Agreed Statement of September 26, 1997, Relating to the ABM Treaty, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Soviet Statement in Connection with the Third Review of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, Department of State Fact Sheet. Washington, DC: Department of State, 1 September 1988.

_____. Standing Consultative Commission Session Ends, Department of State Fact Sheet. Washington, DC: Department of State, 25 June 1996.

_____. START II Documents of September 26, 1997, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. START II Protocol and Letters on Early Deactivation, Department of State Fact Sheet. Washington, DC: Department of State, 26 September 1997.

_____. Statement by the United States of America on Plans With Respect to Systems to Counter Ballistic Missiles Other Than Strategic Ballistic Missiles, Official Statement. Washington, DC: Department of State, 26 September 1997.

_____. The Anti-Ballistic Missile Treaty, Department of State Fact Sheet. Washington, DC: Department of State, 20 May 1996.

_____. The Missile Technology Control Regime, Department of State Fact Sheet. Washington, DC: Department of State, 15 September 1997.

_____. The United States and Russia Declassify Five Agreements from the Standing Consultative Commission, Department of State Fact Sheet. Washington, DC: Department of State, 20 May 1996.

_____. Treaty Between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms (START II). Washington, DC: Department of State, 3 January 1993. Database on-line. Available from ACDA homepage at www.acda.gov.

_____. United States Unilateral Statement Following ABM Treaty Review, Department of State Fact Sheet. Washington, DC: Department of State, 31 August 1988.

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