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BALLISTIC MISSILE DEFENSE

Information on Theater High Altitude Area Defense (THAAD) and Other Theater Missile Defense Systems

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GAO/T-NSIAD-94-167

Mr. Chairman and Members of the Committee:

I am pleased to be here today to discuss the Theater High Altitude Area Defense (THAAD) system and other theater missile defense systems. We provided you with general information on THAAD in our recent report.[1] To set the stage for your considerations today, I will focus on the status and cost of the theater missile defense concepts and on issues relevant to compliance with the 1972 Anti-Ballistic Missile (ABM) Treaty.

RESULTS IN BRIEF

THAAD is a mobile, land-based system being developed by the Department of Defense's (DOD) Ballistic Missile Defense Organization (BMDO). It is intended to counter theater ballistic missiles at high altitudes and long ranges using hit-to-kill technology. Such intercepts are deemed desirable to reduce the probability that debris and chemical or biological agents from a ballistic missile warhead will reach the ground in damaging amounts. These intercepts are to provide protection to wide areas such as small countries and population centers and to military forces dispersed in a theater of operations. The THAAD system will consist of missiles, mobile launchers, ground-based radars, a tactical operations center, and support equipment.

The executive branch is currently involved in discussions in the U.S.-Soviet Standing Consultative Commission on a proposal regarding the ABM Treaty that would allow systems such as THAAD to be developed and deployed. The treaty prohibits mobile, land-based systems that can counter strategic ballistic missiles, but it does not define the characteristics of either a strategic or a theater missile. However, some theater missiles now approach the capabilities of the older, shorter range strategic missiles in terms of maximum range. As a result, the concern is that THAAD, if given the capability to counter the newer more capable theater threats, would have some capability against strategic ballistic missiles. This would have serious implications for THAAD and the ABM Treaty.

THEATER MISSILE DEFENSE IN THE POST-COLD WAR ERA

With the end of the Cold War, the U.S. ballistic missile defense strategy shifted from defending the nation from a massive attack by the Soviet Union, to protecting U.S. forces and friends from theater ballistic missiles while fighting in a major regional conflict overseas. The need for such protection entered public consciousness during the Persian Gulf conflict.

With this shift in strategy, funding appropriated by Congress to BMDO for national missile defense decreased while funding for theater missile defense increased. In fiscal year 1993 Congress appropriated about $1.1 billion for theater missile defense and about $2.6 billion for

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[1]Ballistic Missile Defense: Information on Theater High Altitude Area Defense (THAAD) System, (GAO/NSIAD-94-107BR, January 27, 1994).

national missile defense. In fiscal year 1994, however, Congress appropriated about $1.6 billion for theater missile defense and only about $1.1 billion for national missile defense.

A threat of particular concern in this era is the proliferation of theater ballistic missiles armed with nuclear, biological, or chemical warheads. Ballistic missile deployments are expected to increase world-wide, despite stepped-up efforts to inhibit their proliferation, and several countries other than the acknowledged nuclear states are developing both nuclear weapons and ballistic missiles.

A BMDO-requested 1992 study indicated that more than 30 types of guided ballistic missiles with ranges of 30 kilometers or greater were either operational or under development in 19 developing nations. Thirteen countries had produced, or were in the process of producing, missiles with ranges greater than 300 kilometers. In addition, the number of countries possessing longer range (greater than 1,000 kilometers) missiles was expected to increase significantly over the next decade.

To address this threat, DOD considered a range of theater missile defense options. The DOD's Bottom-Up Review resulted in a decision to pursue a theater missile defense program that includes

-- the Army's THAAD system,
-- the Army's upgraded Patriot system called PAC-3 (Patriot Advanced Capability - Three),
-- the Navy's sea based lower tier system,
-- the Navy's sea based upper tier system, and
-- an airborne boost phase intercept system.

THAAD, PAC-3, and the Navy's lower tier are funded as major acquisitions in DOD's Future Years Defense Program covering fiscal years 1995 through 1999. The Navy's upper tier system and the airborne boost phase intercept system are being pursued as concept exploration programs, one of which may enter the demonstration/validation phase of the acquisition process in fiscal year 1998. I will now provide some additional details about each of the Army, Navy, and Air Force systems.

ARMY'S TWO-TIER THEATER MISSILE DEFENSE OPERATING CONCEPT

According to program documents, an effective theater missile defense system requires a two-tier architecture, with one system providing the upper tier of protection and the other system providing the lower tier. Neither system, by itself, can fulfill the total theater missile defense requirement, which includes defense of dispersed assets and population centers.

The THAAD system would be the upper tier and provides a wide area of defense, to include coverage of dispersed assets and population centers. Intercepts will occur either outside the atmosphere or high in the atmosphere. The PAC-3 system would be the lower tier, with intercepts well inside the atmosphere, providing defense of critical assets.

This two-tier architecture is designed to intercept threat missiles as far away from U.S. forces or allies as possible, maximize the number of intercept opportunities, and minimize the number of ballistic missiles that "leak" through the defense. However, the two-tier defense is possible only when the THAAD and PAC-3 systems' capabilities overlap. Single-tier coverage results when defending against missiles with ranges either less than the THAAD system's minimum coverage capability or greater than the PAC-3 system's maximum coverage capability. Figure 1 illustrates how the two systems would work together.

Figure 1: Operational Concept of Two-Tier Theater Missile Defense

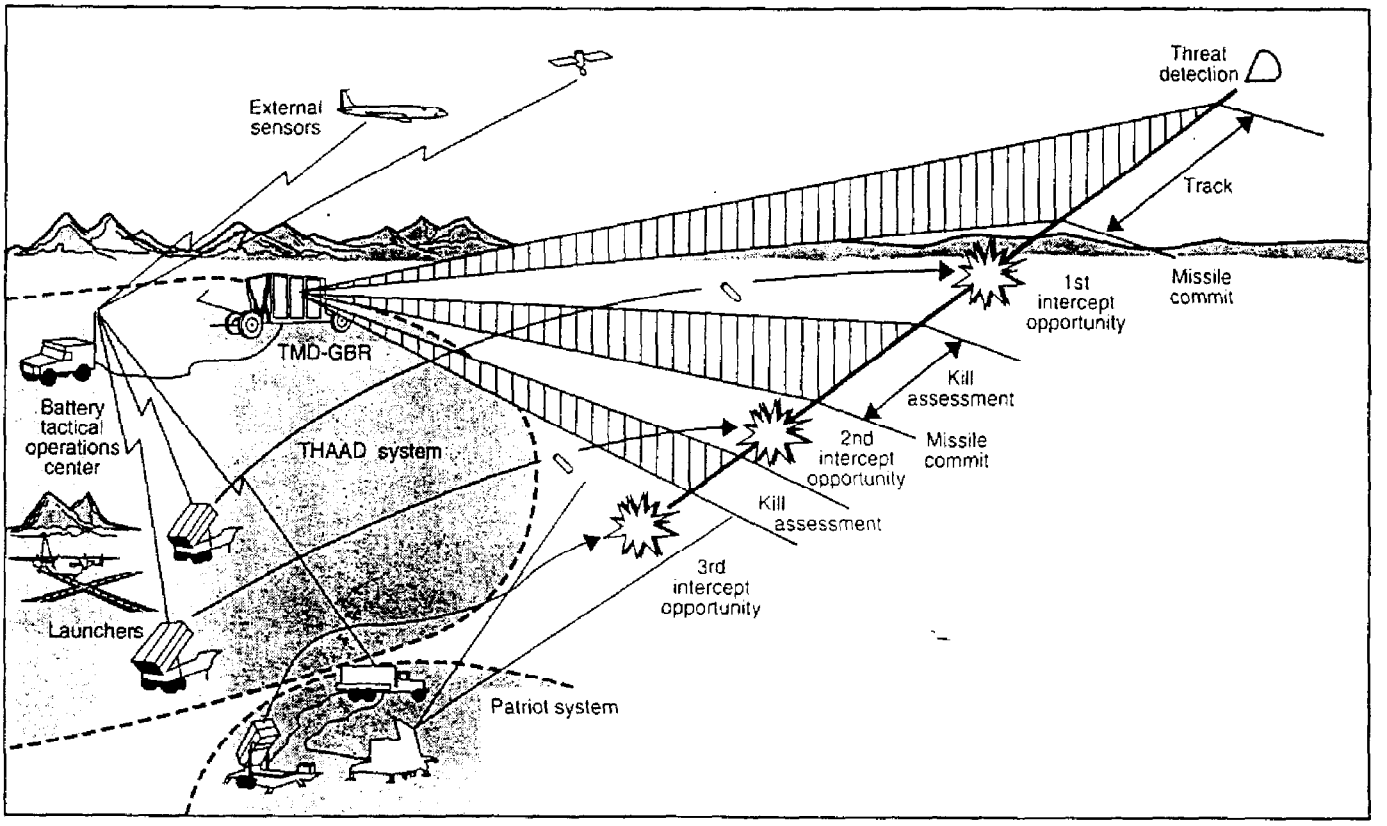


Figure 1 shows how, in a potential sequence of operations, an external early warning sensor, if available, would detect the target and cue the THAAD system for an interceptor launch before the ground-based radar could acquire the target. With or without the external sensor, the ground-based radar would eventually acquire and track the target.

After receiving target identification and guidance information from the radar, the THAAD interceptor would be launched toward the target, and a kill assessment would be conducted by the radar and tactical operations center. Then, if necessary, a second THAAD interceptor would be

launched. If the subsequent kill assessment shows that the target still was not destroyed, the radar would cue the PAC-3 system to engage the targets that evaded the THAAD system.

THAAD System

In 1990, BMDO initiated the THAAD system requirement as a hit-to-kill technology demonstration program. In September 1992, a 48-month demonstration/validation contract was awarded to Lockheed.

The life-cycle cost estimate for the THAAD system is $14.9 billion in then-year dollars. This amount includes $4.5 billion for development between 1991 and 2001, $5.7 billion for production between 1998 and 2006, and $4.7 billion for operation and support between 1993 and 2016. These figures update the cost that we provided to you last January. With these funds, BMDO plans to buy 1,422 THAAD interceptors, 99 launchers, and 18 ground based radars. Since each THAAD battery would require 150 interceptors and 9 launchers, these quantities would support 8 firing batteries, plus spares.

The first THAAD flight test is scheduled for the last quarter of this year. In 1995, BMDO may exercise an option to buy 40 User Operational Evaluation System missiles that would be available for early deployment in 1996 or 1997 if needed in an emergency. The THAAD system is scheduled to enter the engineering and manufacturing development phase in 1996, and low-rate initial production is planned to begin in 1999. The date that the first unit in the field is to be equipped is expected to be 2001, with full-scale production to begin in 2002.

PAC-3 System

The original Patriot was a surface-to-air guided missile system designed to protect U.S. forces from air strikes. The system was initially deployed in Germany in 1985, and the Army subsequently provided Patriot with the capability to defend against theater ballistic missiles. The version currently deployed, referred to as the PAC-2 system, was used in Operation Desert Storm.

The PAC-3 interceptors, which are under development, will augment the PAC-2 interceptors rather than replace them. When fielded, each Patriot battery would have a combination of PAC-2 and PAC-3 interceptors. In February 1994, the Army selected the Extended Range Interceptor (ERINT) as the new PAC-3 interceptor. This selection must be approved by the Defense Acquisition Board. ERINT is a hit-to-kill interceptor offering advantages in both range and lethality over the PAC-2 interceptor.

The life-cycle cost estimate of PAC-3 using the ERINT is estimated by the Army's Cost and Economic Analysis Center to be $3.2 billion in then-year dollars. This amount includes $776 million for development, $1.98 billion for production, and $371 million for operation and support. BMDO plans to buy 1,500 PAC-3 interceptors, plus a limited number to be used for test

purposes. The first unit is expected to be equipped with PAC-3s by the fourth quarter of fiscal year 1998.

NAVY'S TWO-TIER THEATER MISSILE DEFENSE OPERATING CONCEPT

The Navy is also developing lower and upper tier systems similar to the Army's. However, only the lower tier is currently an approved acquisition program. If produced, both systems could be installed on 51 ships which have the AEGIS Weapon System.

Sea-based Lower Tier Area Defense System

The Standard Missile 2 Block IV is being modified (called Block IVA) to improve its performance against short-range ballistic missiles. Its capability will be similar to the Army's Patriot PAC-3 in terms of defense coverage. The current cost estimate is $4 billion. BMDO is planning to buy 40 User Operational Evaluation System interceptors and two sets of modified software for the AEGIS Weapon System. These could be used to equip two ships in 1997-98.

The first ship equipped with the final system would be operational in 1999. It would be equipped with 20 to 30 Block IVA interceptors. For comparison, a Patriot PAC-3 battery would have 32 interceptors.

Sea-based Upper Tier Theater Defense System

The Navy's upper tier system would have a capability similar to the Army's THAAD. BMDO is evaluating several interceptors for the upper tier system. The current cost estimate is $4 billion. DOD will decide in 1998 whether the program will begin the demonstration/validation phase of development.

AIRBORNE BOOST PHASE INTERCEPT CONCEPT

DOD recently decided to begin concept exploration activities for an airborne boost phase interceptor system. Such a system would consist of an interceptor on Air Force and Navy fighters, such as the F-15 and the F-14, that could intercept theater missiles during their initial boost phase while still over enemy territory. BMDO is currently developing the plans for this program, which will be submitted shortly to DOD for approval.

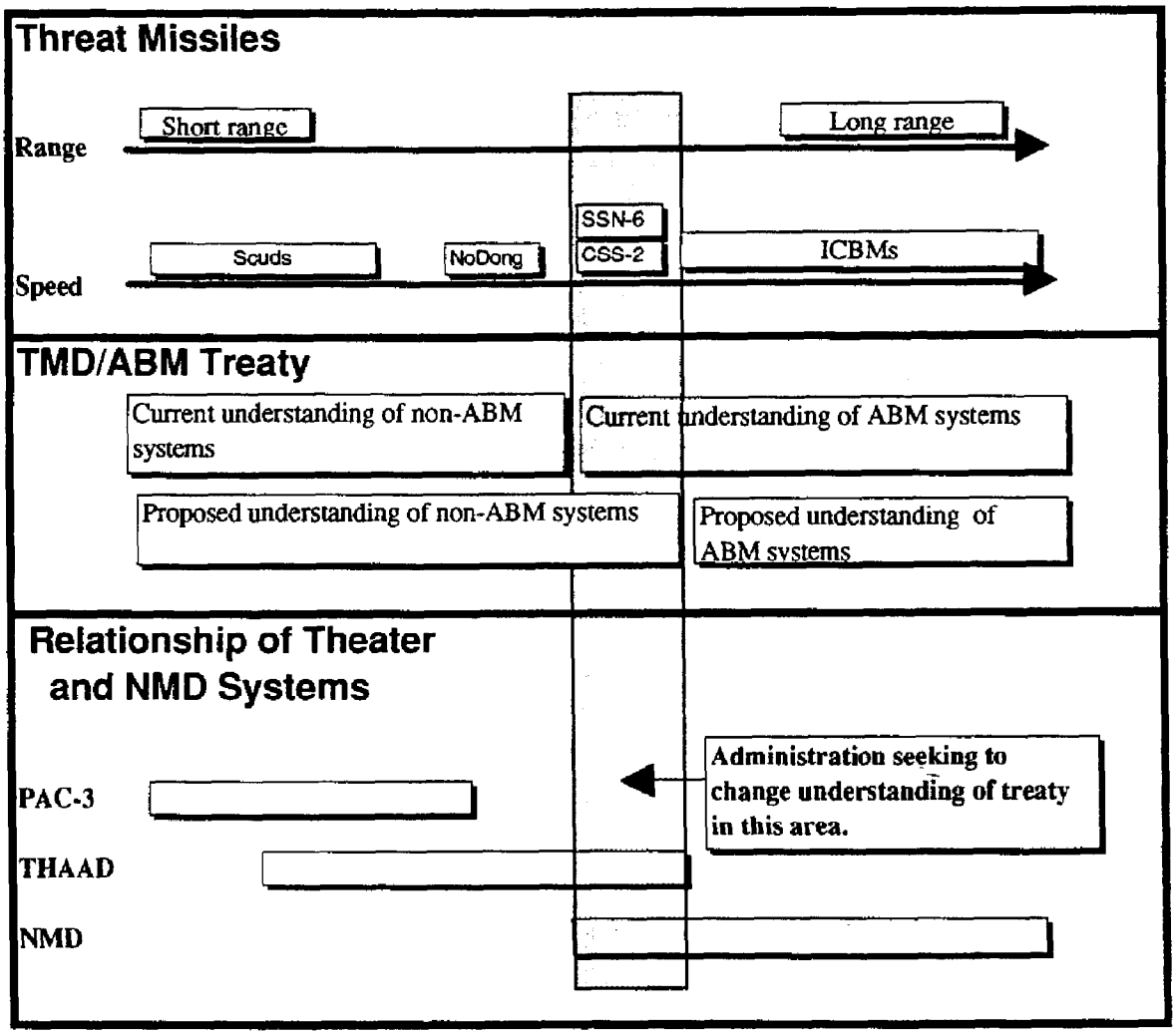
I will now discuss some issues these systems raise concerning compliance with the ABM Treaty.

ISSUES REGARDING ABM TREATY COMPLIANCE

Although the ABM Treaty prohibits mobile, land-based systems that have the capability to counter strategic ballistic missiles, it provides no criteria for determining what constitutes a theater or strategic missile. Consequently, the executive branch is currently discussing in the

U.S.-Soviet Standing Consultative Commission a proposal that, if accepted, would provide a demarcation between strategic and theater systems that would allow systems such as THAAD to be developed in compliance with the treaty. Figure 2 illustrates the nature of the problem that the executive branch is attempting to resolve.

Figure 2: Notional Relationship of THAAD, PAC-3, and National Missile Defense Systems



Legend: TMD = theater missile defense
NMD = national missile defense

One of the measures used for determining whether missile defense systems comply with the ABM Treaty is the velocity of incoming targets. In other words, if a missile defense system is capable of defending against an incoming warhead with a velocity greater than a certain speed, the defense system may be determined to be non-compliant with the ABM Treaty. The velocity of a ballistic missile increases as the range of the missile increases. Since the United States uses velocity as a

measure of treaty compliance, this measure can also be related to the maximum range of the missiles that a system is trying to counter.

Some theater ballistic missiles now approach the capability of strategic missiles. That is, the long-range theater missiles, such as the CSS-2, have ranges (and resulting velocities) that are similar to some of the older, shorter range strategic missiles such as the SSN-6. These older, shorter-range strategic missiles are obsolete and are to be out of the Russian inventory by 1996.

In the fiscal year 1994 Defense Authorization Act, Congress urged the President to immediately pursue discussions on amending the ABM Treaty to permit clarification of the distinctions between theater and strategic missiles. The executive branch is currently seeking a demarcation that would allow systems such as THAAD to be developed in compliance with the ABM Treaty.

RESIDUAL CAPABILITY OF THAAD

Discussion with your staff raised questions about the extent to which the THAAD system, as currently designed, might have capabilities against targets with velocities above those specified in the system's Operational Requirements Document. We have pursued this question with representatives of the Program Office and the Ballistic Missile Defense Organization. It became clear during these conversations that any answer to the question would be highly dependent on the assumptions used in modeling the capabilities of the system.

As you receive information from the executive branch on this question, you may want to assure that it is accompanied by a clear statement of the assumptions used. For example, the following characteristics would have significant impact on the answers derived from modeling:

-- the operational concept involved,
-- the assumed operational characteristics of the target vehicle, including its velocity and its ability to alter it's ballistic path,
-- the shape and location of the protected area relative to both the target's and interceptor's launch sites, and
-- the cueing available to the system from external sensors.

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Mr. Chairman, this concludes my testimony. I will be happy to answer any questions you or members of the Committee may have.

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