Statement of
Brigadier General Emery, USAF
Deputy for Theater and Air Missile Defense
Ballistic Missile Defense Organization
To The
House National Security Committee
Subcommittees on Research & Development and Procurement
March 19, 1997

Mr. Chairman and Members of the Committee, it is my privilege to appear before you today to discuss the importance of international cooperation in the Department of Defense's Ballistic Missile Defense (BMD) programs.

International cooperation on BMD programs must be viewed in the context of the Department's overarching international cooperation and participation strategy. The Under Secretary of Defense for Acquisition and Technology, Dr. Paul G. Kaminski, has noted that "the convergence of the two trends - increased likelihood of committing forces to coalition operations and reduced defense budgets - makes the case for greater armaments cooperation with friends and allies." To maximize interoperability, reduce expenses, and preserve defense-industrial capabilities, Dr. Kaminski stressed that ". . .we will have to leverage the technology and industrial base of all our nations to modernize the equipment of our defense forces at an affordable cost and - in the end - obtain 'best value' for the money." In this context, U.S. interest in international cooperation is motivated by three fundamental elements:

- **Political:** the necessity of strengthening the "connective tissue," i.e., the military and industrial relationships that bind the United States to other friendly nations in a strong, long-term security relationship;
- **Military:** the requirement to plan for a coalition operating environment in which interoperable equipment and rationalized logistics will play key roles; and

- **Economic:** the need to respond to financial constraints on defense budgets and to make greater common efforts in the procurement area.

The Ballistic Missile Defense Organization's objectives for its international program development both complement and reinforce the overarching national security goals outlined by senior policymakers. BMDO's international cooperative activities also implement Congressional direction. The Ballistic Missile Defense Act of 1995, contained in section 236 of the Fiscal Year 1996 National Defense Authorization Act, specifically states, "It is in the interest of the United States. . .to complement the missile defense capabilities developed and deployed by its allies and possible coalition partners. . . .The Congress urges the President to cooperate on a bilateral basis in the development, deployment, and operation of ballistic missile defenses."

As a result of past participation in TMD programs, global proliferation of ballistic missiles and weapons of mass destruction, lessons from the Gulf War, and allied politico-military consultations and discussions, there is greater recognition among our friends and allies of the need to develop effective missile defenses. Consequently, discussions and commitments to TMD-related activities are evident both multilaterally through the North Atlantic Treaty Organization (NATO) Alliance and in unilateral actions by individual nations.

The Department's approach to international participation in the development and deployment of TMD systems continues to build upon consultations with our allies and friends and the establishment of bilateral and multilateral research and development programs. Over the past decade, our allies have invested over $250 million through cooperative programs which are directly related to the U.S. BMD program, including TMD. Cooperative research and development programs make highly advanced technologies from abroad accessible to the U.S. and provide our allies with added insights with which to make informed decisions regarding their own missile defense requirements. The United Kingdom and Japan, for instance, are currently involved in separate studies to determine their national BMD requirements and policy.

This cooperation has encouraged wider agreement on the likelihood and impact of the use of missiles in a theater conflict and the recognition of the need to develop an effective, layered response to that threat. Other nations now recognize the existing and emerging threat of ballistic missile attack and, as a consequence, discussions and commitments to TMD-related activities by our friends and allies is increasing. Our allies are continuing to invest in TMD capabilities, and these commitments are evidenced both in unilateral actions by individual nations and multilaterally through the NATO Alliance.

Medium Extended Air Defense System (MEADS)

Operationally and tactically, U.S. military forces will likely fight on less dense battlefields, over greater expanses of land and with large gaps between friendly forces. Ground force commanders will incur risks as they constitute forces in major unit assembly areas upon arrival into a theater of operations. In addition, U.S. forces will likely be fighting alongside coalition partners. Therefore, we must be prepared to fight not just jointly, but with combined forces as well. In some cases, the first TMD systems in a theater of operations may be those of allies and friends. Hence, TMD systems require strong levels of interoperability between U.S., allied and friendly systems.

Both the U.S. Army and Marine Corps have requirements for a system that can provide maneuver forces 360 degree defense protection against short-range tactical ballistic missiles, cruise missiles and unmanned aerial vehicles. This system would be highly mobile to ensure it can travel with the maneuver force, and transportable to ensure its can be easily and rapidly deployed to a theater of operations. Currently, both Germany and Italy have similar military requirements to protect their maneuver forces.

The Medium Extended Air Defense System, or MEADS, is a cooperative development program between the U.S., Germany and Italy, with a cost share of 60, 25, and 15 percent respectively for the program definition/validation phase. As such, it represents a model for future transatlantic armaments cooperation efforts. New development programs are expensive and unilateral development and fielding sometimes makes them unaffordable. Through international cooperative development programs, such as MEADS, true burden sharing allows us to field highly effective defensive systems *with our allies* in a more affordable manner. For example, in 1993, an Army/BMDO RDT&E cost estimate for a U.S.-only Corps SAM new start program was $3.1 billion. The use of technology leveraging from DoD investments in the TMD mission area and multi-national burden sharing by the U.S., Germany and Italy have reduced that cost estimate. Burden sharing with our allies on MEADS reduced the current cost estimate to $2.1 billion for RDT&E.

MEADS reinforces alliance solidarity in the face of the proliferating cruise and ballistic missile threat and will provide increased interoperability among allied armed forces. NATO has recognized the necessity of adapting its force structure to new crisis management and intervention missions, conceivably outside its historic area of operations, through the Combined Joint Task Forces (CJTF). MEADS responds to the CJTF requirement for an effective, interoperable extended air defense system that can protect against ballistic and cruise missile attack. Moreover, having MEADS deployed with our allies would mean less reliance on strictly U.S. assets to defend U.S. and allied forces and interests.

United Kingdom

As a victim of the V-2 attacks during World War II, the United Kingdom has a keen understanding of the psychological and military utility of these weapons. As a major coalition partner with the United States during the 1991 Gulf War, the British could recall that earlier era during Iraq's use of ballistic missiles and the threat of weapons of mass destruction against coalition forces, reinforced this understanding concerning the dangers such weapons could pose in future conflicts.

In 1985, the United Kingdom became the first country to sign a Memorandum of Understanding with the U.S. for ballistic missile defense cooperation. Since then, numerous British universities and industries, as well as key government defense establishments, have been involved in some aspect of cooperative ballistic missile defense research with the United States. The first such venture between the U.S. and U.K. began in 1986, when we awarded several contracts to the U.K. Ministry of Defence to study battle management/command, control and communications in theater missile defense. Since then the United Kingdom has been actively involved in a variety of mutually beneficial BMD data exchanges, scientist and engineer exchanges, joint studies and experiments. Investments in these and similar programs, studies and experiments over the past twelve years have led to a strong relationship within the United Kingdom's defense establishment and industry on BMD issues.

In October 1994, the U.K. Ministry of Defence contracted with British Aerospace for a BMD Prefeasibility Study to examine possible BMD systems to counter potential threats to the United Kingdom, the Dependent Territories, and British forces deployed abroad. The study assessed BMD architectures for a range of scenarios, taking into account industrial and technical costs, risks and time scales. The study's findings will recommend the most appropriate technologies and systems to cover the widest possible range of BMD applications for defense of U.K. territories and assets. The study is currently undergoing coordination within the Ministry of Defence.

Israel

Israel, like the United Kingdom, has experience with ballistic missile attacks. During the past two decades, ballistic missiles and rockets have been launched against the State of Israel by neighboring states. The proliferation of chemical and biological weapons among potential adversaries has sharpened Israel's concern about defense against missile attack and has reinforced the priority initiatives in Israel to develop a missile defense system. The Iraqi Al Hussein missile attacks against Israel during the Gulf War underscored this concern. As a result, Israel has a strong ballistic missile defense policy that commits Israel to fielding a missile defense capability to protect its homeland.

Israel has been actively involved in cooperative missile defense programs with BMDO since 1986 when it signed a Memorandum of Understanding with the United States. Given the existing and rapidly developing missile threats in the region, Israel was the first allied nation to declare its intent to field a missile defense system as a national priority. Cooperative activities have included architecture studies; participation in several technology experiments; test bed development, enhancements, and experiments; examination of boost-phase intercept concepts; and, most prominently, the development of the Arrow Interceptor.

The ongoing Arrow Continuation Experiments (ACES) began in July 1991. With the successful intercept of a target missile in June 1994, and validation of the pre-prototype design, the Arrow program progressed into the development and testing of its smaller two-stage Arrow 2 missile. The first flight test of the Arrow 2 on July 30, 1995, successfully demonstrated the interceptor's propulsion system and aerodynamic controls. The second flight test on February 20, 1996, successfully demonstrated the Arrow 2's focal plane array and booster motor. Its first intercept flight test on August 20, 1996, resulted in the successful destruction of a target missile. Just last week, on March 11, 1997, the Arrow 2 again successfully intercepted a target ballistic missile. Two more tests of the Arrow 2 design are planned for the remainder of the ACES program, which is expected to be completed in 1997. In parallel with the cooperative ACES program, Israel pursued development of the Arrow Fire Control Radar, Launch Control Center, and Fire Control Center with its own funding.

Given the progress in these Israeli programs and the anticipated success of the cooperative ACES program, Israel committed to the near-term deployment of an active theater missile defense system. The Department of Defense and Israeli Ministry of Defense signed the Arrow Deployability Program (ADP) agreement on March 29, 1996. The ADP agreement provides for the integration, test, and evaluation of the Arrow Weapon System (AWS), namely, the jointly developed Arrow interceptor and Israeli-developed Fire Control Radar, Launch Control Center, and Fire Control Center. An interface will be developed for interoperability between the AWS and U.S. theater missile defense systems. Lethality, kill assessment, and producibility will also be jointly examined under this agreement.

BMDO and the Israeli Ministry of Defense are discussing a follow-on effort to a joint boost-phase intercept study that was completed in January 1996. The follow-on study would further the boost phase intercept concept developed by Israel and provide the United States unique data for analyses, lessons learned, and technology risk mitigation.

Germany

In 1986, Germany and the United States signed a Memorandum of Understanding to work on cooperative research, development and production of missile defense systems. Since that time, Germany has engaged on a number of joint activities to contribute to the program's technology effort and to enhance our joint capability to defend against missile attack. For instance, several years ago, Germany cooperatively worked with the SDIO on a space shuttle mission that tested space-based optical sensors to study plume phenomenology.

In particular, the United States and Germany have enjoyed a close, cooperative relationship in air defense activities since 1989. One of the most prominent programs is a joint endeavor to upgrade Germany's PATRIOT systems which were purchased

from the U.S. in the 1980's and a program to develop and deploy the next generation PAC-3 system. The German Air Force currently operates 36 operational PATRIOT squadrons (320 launchers) with TMD capability. This includes 12 squadrons that are U.S.-owned and used to protect U.S. military bases. Germany also purchased the HAWK system from the U.S. in the 1960's. These two systems, along with the ROLAND, constitute the core of Germany's ground-based air defense capability. Germany has procured the PAC-3 Configurations 1 and 2 (guidance enhanced missile, radar and communication enhancements) and is considering the purchase of the Configuration 3 system (new hit-to-kill interceptor and remote launch communications, and enhanced radar). German interest remains high on PAC-3 Configuration 3, but final commitment is pending German Ministry of Defense approval.

Germany is collaborating with the U.S. and Italy to create a new air defense missile system with extended air and missile defense capability to protect its armed forces. Initially established as its TLVS project (Takische Luftverteidgung System), Germany merged its effort with the U.S. Corps SAM and the Italian SAM-T programs to form the international Medium Extended Air Defense System (MEADS) program outlined above.

The U.S. and Germany also have an ongoing cooperative program to enhance overall TMD interoperability between our respective air defense tactical operations centers and in July 1996 entered into an agreement to conduct joint test bed experiments and analyses.

Italy

The United States and Italy signed a Memorandum of Understanding in September 1986 concerning cooperative research for the Strategic Defense Initiative. This overarching agreement was initiated to facilitate Italian government and industry participation in SDI research and development.

Italy is one of a few NATO countries currently within range of tactical ballistic missiles located in North Africa. Italy's vulnerability to ballistic missile attack was underscored when Libya launched two SCUD missiles against the Italian island of Lampudusa in the 1980's, following the U.S. attack on Tripoli. The incident, coupled with the proliferation of ballistic missiles in the region, spurred Italy to explore replacing its I-HAWK weapons system. It also prompted Italy to join the United States and Germany in the MEADS co-development program. The Italian Ministry of Defense is currently working on a comprehensive plan for air and missile defense that addresses both the threat and proposed defense system architectures.

France

In February 1994, the United States and France concluded an Agreement in Principle establishing an Extended Air Defense/Theater Missile Defense Bilateral Working Group to explore opportunities for bilateral cooperation in BMD. As a result of the 1994 Defense Ministry White Paper, France initiated an aggressive five year technology development program in BMD to be carried out indigenously and in cooperation with other NATO nations. The White Paper highlighted the dangers posed by proliferation and called for the development of extended air defenses, including anti-missile systems. Although the French Government was not prepared to make a financial commitment to the MEADS program, France continues to demonstrate interest in participating with the United States in other missile defense areas, such

as battle management/command, control and communications; phenomenology research; and extended air defense simulation modeling.

The Netherlands

The Netherlands' role in ballistic missile defense flows from its strong participation in NATO activities, especially NATO's integrated air defense efforts. The Dutch are studying their requirements and may purchase the PAC-3 to upgrade its operational PATRIOT theater missile defense capability. If they proceed, these improvements will allow Dutch forces to participate more effectively in peacekeeping and coalition operations.

The Netherlands is in the process of acquiring the U.S. Extended Air Defense Simulation (EADSIM) modeling tool. Dutch missile defense programs undertaken in cooperation with the U.S. also include hypervelocity gun tests (conducted with 70 percent Dutch financing), other electro-magnetic launch technologies, and theater air defense architecture studies. The Netherlands has also expressed interest in the Navy's planned Standard Missile Block IVA developments for inclusion in its next generation air defense Frigate 2000.

North Atlantic Treaty Organization

NATO's policy supporting an Alliance Theater Missile Defense capability is steadily developing. It began in the early 1990's with an appreciation of the risks posed to the Alliance by the proliferation of weapons of mass destruction and the means to deliver them among rogue nations to the South and East of NATO's periphery. NATO's new Strategic Concept recognized the necessity to protect NATO's deployed military forces, territory, and population against ballistic missiles with weapons of mass destruction. An integrated NATO concept for extended air defense encompasses the need to defend against combined threats consisting of air-breathing vehicles, tactical aerodynamic missiles, and ballistic missiles. A Military Operational Requirement (MOR) for Active Theater Ballistic Missile Defense has been prepared by NATO's major commands (SACEUR and SACLANT). More recently, NATO Defense Ministers have endorsed the Senior Defense Group on Proliferation Report, which found that extended air defense, including tactical ballistic missile defense, was an essential component of NATO's response to the proliferation risk, and that the Conference of National Armaments Directors (CNAD) should develop options for pursuing a layered defense for NATO's deployed forces and report back to the North Atlantic Council.

The CNAD established an Extended Air Defense/Theater Missile Defense Ad Hoc Working Group in 1993, composed of interested nations with resources to contribute, to examine mechanisms and opportunities for cooperation on ballistic missile defense. This group completed its work in 1995 and submitted its report that identified nineteen possible areas for cooperation in TMD, provided an initial plan for proceeding with sensor, weapon, and BM/C3 activities and, finally, recommended a follow-on group be established to:

- Specifically examine requirements and ways to cooperate/collaborate on missile defense BM/C3, and
- Develop technical systems configurations for TMD including associated costs.

The CNAD endorsed these recommendations and a Missile Defense Ad Hoc Group was established. The group, composed of fourteen nations, has been given three principal directions. First, to provide an initial focus on TMD battle

management/command, control and communications for the CNAD. Second, to develop a range of technical configurations and associated cost estimates. The third task is to identify a range of acquisition options for NATO layered TMD, in the first instance, to protect alliance military forces in a contingency situation. In April 1996, the U.S. began sharing theater ballistic missile early warning information in real time to NATO. The Shared Early Warning System is operational today at NATO's SHAPE Headquarters and at a variety of national locations.

Japan

In 1987, the U.S. and Japan signed an overall Agreement Concerning Japanese Participation in Research for the Strategic Defense Initiative. Japanese involvement has included bilateral TMD cooperation between the U.S. and Japanese industry. For example, Japanese industry participated in the 1988-1993 "SDIO Western Pacific Architecture Study," and several small high technology projects are being pursued.

Japanese interest in BMD has been growing as a result of missile tests and exercises in the region, as well as concern about proliferation. The U.S. - Japan Bilateral Study on Ballistic Missile Defense, which will provide the basis for a political decision on acquisition of Theater Missile Defenses, is an integral part of the Japanese Government's acquisition process. It is scheduled to be completed in the Summer of 1997. To support the study, the United States provides defense system performance and threat information to Japan to assist in making an informed decision. Additionally, the overarching U.S.-Japan Working Group continues to share information on general TMD issues.

Other significant TMD-related issues center on the continued Japanese licensed production and deployment of the upgraded version of the PATRIOT (PAC-2) and the recent commissioning of the third of four programmed AEGIS class destroyers. Additionally, Boeing Aircraft Corporation is currently producing E-767 Airborne Warning and Control System (AWACS) aircraft to be provided to Japan via Foreign Military Sales.

In April 1996, the U.S. began sharing theater ballistic missile early warning information in real time to the Japanese.

Australia

Australia and the United States have established a modest program of cooperation that focuses on common interests in preventing the proliferation of weapons of mass destruction and affording protection from missile attack. Cooperative BMD activities between BMDO and the Australian Defence Science and Technology Organization (DSTO) concentrate on technical and scientific cooperation and interchange. These activities are based on the Cooperative and Collaboration Research, Development and Engineering Agreement that was signed in October 1994.

As a result of the March 1994 U.S.-Australia Ministerial talks and the 1994 Australian Defense White Paper, a cooperative project involving sensor/data fusion testing was conducted at Australia's Woomera Missile Range in October 1995. This experiment correlated multiple sensors (optical and RF radar) during the boost phase of a rocket and transmitted the real-time data and imagery via satellite link to the United States.

A more elaborate missile target detection and identification experiment is scheduled for the Fall of this year. This project, called DUNDEE, will use the Australian Jindalee Over-the-Horizon Radar and the BMDO Midcourse Space Experiment (MSX) satellite. Four short-range Terrier-Orion missiles will be launched out to sea from the northwest Australian coast in an experiment designed to explore the detection of missiles during their boost-phase.

In addition to these activities, the U.S. and Australia have sponsored a number of technical and scientific personnel exchanges. The first personnel exchange brought an Australian DSTO scientist to the Applied Physics Laboratory of Johns Hopkins University to work on data fusion from electro-optic sensors as part of the MSX program.

Russia

At the September 1994 Summit in Washington, D.C., Presidents Clinton and Yeltsin agreed that the U.S. and Russia would conduct a joint theater missile defense (TMD) exercise. The aim of the TMD exercises is to provide a practical basis for U.S. and Russian forces to cooperate in TMD operations in future military operations where each side's forces are deployed together against a common adversary possessing theater-class ballistic missiles. The sides successfully completed the first U.S.-Russian TMD command post exercise (CPX) in June 1996 at the Joint National Test Facility in Colorado Springs. We are now preparing for a second TMD CPX that will be hosted by Russia in early 1998.

BMDO is involved in a number of technology cooperation projects with Russia. Several programs and experiments are planned or underway. Specifically, two modest projects are the Russian-American Observational Satellite (RAMOS) and the Active Geophysical Rocket Experiment (AGRE) programs. RAMOS is a program that is currently comparing measurements from U.S. and Russian sensor platforms and verifying the compatibility of the data. RAMOS assets also will be able to monitor changes in the Earth's ecosystem and watch for environmental threats and disasters.

AGRE is a joint project between the Applied Physics Laboratory at Johns Hopkins University, sponsored by BMDO, and the Russian Academy of Sciences' Institute for Dynamics of the Geosphere. AGRE was recently completed with a series of sounding rocket experiments that will help scientists better understand plasma phenomenology in the ionosphere. A final data exchange is scheduled for next month.

BMDO is also engaged with Russia in a variety of other basic and applied research programs. These are relatively small scale cooperative technology projects, such as research on Hall thrusters for propulsion, advanced radar technologies, and solar power and photovoltaics.

Central and East Europe Nations

BMDO is exploring opportunities for joint projects on technological research and cooperation with several countries in Central and Eastern Europe. Dialogue and some specific *small* projects have been started with the Czech Republic and Poland.

The Czech Republic, for instance, has participated in a personnel exchange in which a Czech scientist visited U.S. BMD research and development facilities. At a later date, a U.S. scientist may visit Czech facilities. Additionally, BMDO has small

research contracts in the Czech Republic; for example, with Charles University in Prague.

Conclusion

In closing, Mr. Chairman, I believe international participation in the BMD program reflects the growing concern within the world community regarding the proliferation of ballistic missiles and weapons of mass destruction, and the willingness of some nations to use those weapons. Allied cooperation in the BMD program provides the framework for developing and deploying affordable, effective and interoperable TMD systems. Through international cooperation in the Ballistic Missile Defense program, the Department seeks to reinforce U.S. national security goals. Specifically, international cooperation in missile defense strives to:

- Strengthen U.S.-Allied mutual security agreements;
- Support counterproliferation strategies and policies;
- Provide incentives for allied nations to increase investments in BMD;
- Facilitate the definition of common military requirements and promote interoperability and standardization;
- Bring together U.S. and Allied technologies, systems, and unique capabilities; and
- Share and reduce program costs.

BMDO's international cooperative programs support the Department's policy direction that every possibility be examined to increase the effectiveness of U.S. military forces and those of our allies and friends, while making the most efficient use of resources applied to our collective defense.

Thank you, Mr. Chairman. I look forward to working with all the Members of the Committee on this important program. Mr. Chairman, that concludes my statement. I look forward to addressing the Committee's questions.