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Ballistic Missile Defense

The Ballistic Missile Defense (BMD) program gained increased significance in 1982 when the Reagan administration announced its strategic modernization plan on 2 October 1981. This plan would terminate Multiple Protective Shelter (MPS) basing of the Air Force's MX inter-continental ballistic missile (ICBM); direct immediate deployment of 100 MXs in U.S. Minuteman ICBM silos as a temporary means of improving strategic capability; and direct further research and development on BMD and two other potential basing options, one or more of which would be chosen in 1984, for increasing long-term survivability of the missile. The U.S. Congress moved up the decision date to July 1983, and then to December 1982.

The U.S. Army BMD program manager and deputy program manager relocated from Huntsville, Alabama, to the U.S. Army BMD Program Office in Washington, D.C. The purpose of the move was to improve efficiency in responding to increased management demands from Washington. At the same time as the relocation, which occurred in September 1982, command of the organization's Ballistic Missile Defense Systems Command (BMDSCOM) in Huntsville, a dual function of the program manager since 1976, reverted to a separate position.

In 1982 the BMD organization was authorized 106 military and 523 civilian spaces. Funding obligations totaled \$596,948,233 and included \$125,473,224 for the Advanced Technology Program, \$333,061,981 for the Systems Technology Program, and \$138,413,028 for the Kwajalein Missile Range.

Responding to the President's strategic modernization decision, BMD management in 1982 reassessed and reoriented the Systems Technology and Advanced Technology programs. A balance was sought between two major objectives: first, the preservation of cost-effective defense options which could be developed and deployed rapidly to meet near-term objectives with low development risk; and second, the maturation of advanced technology systems concepts which could counter projected Soviet threat growth and still be cost effective.

Attention was focused on two major efforts within the Systems Technology Program: (1) the pre-prototype program in progress since 1979 to demonstrate technology associated with an endoatmospheric Low-Altitude Defense (LoAD) system capable of defending land-based ICBMs deployed in MPS or fixed silos; and (2) the Homing Overlay Experiment (HOE) concerning technology for a non-nuclear exoatmospheric interceptor. Work also continued on other aspects of the program: advanced systems analysis, systems definition studies, development of threat and weapon effects data, evaluation of

BMD in relation to current proposals resulting from strategic arms limitation or reduction talks, and formulation of options for the second of the reviews required every five years on the Antiballistic Missile Treaty. The strategic evaluations supported systems definition studies and also provided responses to requests from the Army's Office of the Deputy Chief of Staff for Operations and Plans, Office of the Undersecretary of Defense for Research and Engineering, Office of Director of Defense Program Analysis and Evaluation, and the Arms Control and Disarmament Agency.

Activity was stepped up for the LoAD effort, which was given the name SENTRY in April 1982 and later altered to SENTRY-D. The SENTRY Project Office performed extensive analyses to determine BMD effectiveness in defense of the MX in various basing modes, including closely spaced basing (CSB). The office also participated in MX basing studies with the Air Force Ballistic Missile Office-BMD Core Group and with the Air Force staff panels. On 14 June 1982, the Secretary of Defense issued formal directions reorienting the SENTRY effort from support of the MPS-based MX to the MX in a CSB mode. Management then redirected development of major components, such as the interceptor, radar, and data processor, for the system to address specific issues peculiar to CSB. Testing progressed on the major components, most of which were based on technology proven in the Site Defense and other programs. The accelerated and restructured SENTRY effort was designed to support the fiscal year 1983 decision called for in the President's plan regarding a U.S. strategic deployment option.

Development progressed rapidly on the vehicles for the scheduled HOE flight tests, which would decide technical issues associated with optical homing and non-nuclear kill capability in the exoatmosphere. Special emphasis at all management levels resolved problems encountered during 1981 in developing the long wavelength infrared homing sensor, and fabrication was completed on several sensors. Calibration of the Flight-1 homing sensor was concluded in August and begun on the Flight-2 sensor, which will also be used as a backup for Flight-1. Structural elements were finished for some HOE flight vehicles. Systems tests were completed for the first HOE Flight Test Vehicle-1 (FTV-1) and started on the second. Flight preparations began using FTV-1, and refinement of launch operational procedures and training of launch crews and support personnel proceeded. Following an in-process review to determine its readiness, the FTV-1 was shipped to the Kwajalein Missile Range.

In systems definition efforts to provide U.S. responses in the event of unconstrained growth of the Soviet threat, primary attention was given to pursuit of an endoatmospheric non-nuclear kill (ENNK) capability to replace or augment the nuclear interceptor in the SENTRY system. Obvious advantages of an ENNK system include greater public acceptance, avoidance of nuclear release requirements, more siting and handling flexibility, and the ability to be thoroughly tested. An intensive study of the feasibility of such a system was conducted from 13 November 1981 to 8 January 1982, and the results were briefed to the Undersecretary of the Army and to the Office of the Secretary of

Defense (OSD). Interest in the project led to the establishment of an ENNK task force on 6 July 1982 to determine top-level system performance parameters, to develop ENNK system concepts, and to formulate specific technology requirements.

Also under consideration as a cost-effective option of the BMD growth was a layered defense concept in which an exoatmospheric defense system such as HOE combined with an endoatmospheric underlay defense such as SENTRY to provide a two-tiered defense for fixed-base ICBMs and other high-value targets. In the BMD study initiated in 1981 to define a layered defense system for the 1990s, three prime contractors submitted separate concepts for such a system. In March 1982, BMDSCOM extended the study of these proposals, which were (a) a concept for high-value target defense, (b) a concept for sea-launched ballistic missile defense, and (c) a concept for ICBM defense.

In June 1982, in response to an inquiry from OSD, the BMD program manager established the Spartan Defense System Task Force to determine the efficacy of the Spartan missile in defense of the MX ICBM deployed in a CSB mode. Using Spartan for this purpose was appealing since both the missile and its warhead had already been developed and thoroughly tested, and a number of both had been stockpiled when the SAFEGUARD BMD system was deactivated. Using Spartan, however, required definition of a system to perform those functions previously done by other components of the SAFEGUARD system. The task team defined such a system based on existing hardware, and it determined Spartan's effectiveness in defending the MX in a CSB mode against a number of plausible attack scenarios. Results were given to OSD in September 1982.

The Simple-Novel System Working Group was established in July 1982 to evaluate rapidly deployable concepts for defense of CSB. Analysis of two concepts, conventional guns and environmental dust, was completed before the end of the year.

In August 1982, the Systems Technology Project Office initiated phase II of the Airborne Optical Adjunct Study in which a versatile, multimission threat acquisition system would be defined and a development program planned for a tactical prototype demonstration.

In the Advanced Technology Program, conducted by the BMD Advanced Technology Center (BMDATC), management focused attention on efforts offering substantial potential for improving BMD capabilities. Major technology efforts included the ENNK Technology Program, the Designating Optical Tracker Program, the Forward Acquisition System Program, the Optical Aircraft Measurements Program, the Miniature Kill Vehicle Program, the Distributed Data Processing Program, and the Cobra Judy shipborne radar program.

Operating under a severely constrained budget, BMDATC limited its ENNK efforts to establishing key technologies that were critical to the operation and effectiveness of the

system. Concept definition studies determined an ENNK capability. Installation of radar was completed at the Kwajalein Missile Range for use in collecting ENNK data. By direction of the Undersecretary of the Army, BMDATC began planning for an expanded ENNK development program to provide a broad technology base from which lower-risk ENNK systems of the future could be constructed.

A successful flight of BMDATC's Designating Optical Tracker Program was concluded in August 1982. This flight, as well as previous ones, progressively demonstrated the capability of long-wavelength infrared sensors to perform more complex, generic BMD functions under realistic engagement geometry and environmental conditions. Additional flights are planned.

Significant progress was made in the Forward Acquisition System Program, designed to resolve critical system and technology issues associated with the BMD forward acquisition function through comprehensive ground testing. Critical design reviews were completed, and system, subsystem, and interface performance specifications were published. However, this program was terminated at the end of fiscal year 1982 to make funds available for a higher-priority program.

Several milestones were achieved in the Optical Aircraft Measurements Program (OAMP) in 1982. In the aircraft platform area, a Boeing 707b aircraft was purchased from American Airlines through an Air Force contract and was delivered to Wright-Patterson Air Force Base, Ohio, in March. In June 1982, the 60-percent design review of the aircraft hangar was conducted satisfactorily. Separate contracts were awarded for the focal plane array development and the sensor integration effort. The preliminary design review of the focal plane array was done in September 1982. In August 1982, the Army and the Air Force signed a memorandum of agreement outlining their respective responsibilities and roles in the program.

In the Miniature Kill Vehicle Program, BMDATC successfully tested lightweight motors and designed a more advanced optical sensor. Management identified the most expensive items in the technology areas in order to cut potential production costs.

Cobra Judy, a shipborne S-band phased array signature instrumentation radar system (operating on a 8-15 cm wavelength and 2-4 GHz frequency), underwent rigorous testing and evaluation before becoming fully operational in 1982. The system's performance was outstanding. In fiscal year 1983, it will be transferred to the U.S. Air Force Eastern Space and Missile Center. Specifications have been finished for adding a single-beam X-band radar (operating on a 2.5-4 cm wavelength and a 8-12 GHz frequency) to the system. Unlike the basic system which was jointly funded, the modification is to be completely funded by BMD, and then all funds for operating the modified system are to be provided by the Air Force.

A number of projects completed in 1982 improved Kwajalein Missile Range (KMR) capabilities. A high-speed digital data transmission link set up between Lexington, Massachusetts, and the missile range provided almost immediate delivery of mission information to Lexington for data reduction operations. Crypto equipment, incorporated at the terminals of the link, ensured secure communications. A multistatic measurements system, developed under joint BMDATC and KMR sponsorship, improved calculation of the pierce point of a reentry vehicle as well as flight diagnostics. This system uses multiple remote sites for tristatic reception of Target Resolution and Discrimination Experiment (TRADEX) L-band radar (operating on a wavelength of 15-30 cm and a frequency of 1-2 GHz) echoes as well as bistatic echoes of the ARPA (Advanced Research Projects Agency) Long-Range Tracking and Instrumentation Radar's (ALTAIR's) ultra-high frequency (UHF) signals for signature analysis and netted defense technology tests. Modifications to the ALTAIR made it a fully operational contributing sensor of the Air Force Detection and Tracking System. Also completed was installation of a millimeter-wave instrumentation radar. When this system, a BMDATC project begun in 1981, is fully calibrated, it will collect data on reentry targets and satellites.

In 1982, the missile range successfully completed development of the C-7A Terminal Area Support Aircraft and the Kwajalein-Broad Ocean Area Tugboat projects in support of MX testing. In engineering tests using two targets of opportunity, the aircraft and tugboat demonstrated terminal area scoring with the Sonobuoy Missile Impact Location System (SMILS), telemetry with a wide-angle luneberg lens, and optics with streak and motion picture cameras. A Department of Energy vessel was leased to reference the SMILS array geodetically. The availability of land reference in the Marshall Islands allows the MX impact area to be extremely accurate for reentry vehicle scores.

In 1982, negotiations regarding present and future use of the KMR continued between the U.S. and the Republic of the Marshall Islands (RMI), one of the self-governing entities which make up the Trust Territory of the Pacific Islands. On 30 May 1982, U.S. and RMI officials signed an agreement to end the 35-year U.S. trusteeship. When ratified by the United States and the Marshall Islands, this Compact of Free Association would recognize the islands' autonomy but would give the United States extensive access to Kwajalein and other Marshall Islands over the next fifty years in exchange for \$1.5 billion in economic aid and rent. An interim agreement provided continued U.S. access pending ratification of the compact. On 18 June 1982, the Kwajalein Atoll Corporation, an association of Kwajalein landowners, began an organized occupation on two major KMR installations, primarily to protest the terms of the compact. Since the demonstration was illegal according to the interim agreement, the U.S. waited for RMI and the landowners to settle the matter themselves. However, when the issue remained unsettled, the United States began discussions with the RMI and the landowners on 2 September 1982 in an attempt to determine what issues needed to be resolved to end the demonstration. These discussions set the stage for further negotiations in Washington, DC, in October 1982.