

DEFENDING THE HOMELAND

Path of missile defense development full of ups and downs

By MAJ Laura Kenney

The missile blasting triumphantly out of the silo that foggy September morning in 2006, to soon even more resoundingly meet and destroy a target at over 100 miles measured straight up, symbolized a defining and culminating moment in the history of missile defense. Such a moment will only be eclipsed with a future actual usage of the system for the purpose for which it's intended — destroying a ballistic missile aimed at the United States of America. The path to the September victory, from the earliest beginnings of missile defense theory and nascent practice, to the technological marvel represented by the “hitting a bullet with a bullet” flight test has been a rocky one...

The need for an anti-missile system originated during World War II with the success of Germany's short range ballistic missiles against London and Antwerp. The threat posed by longer range missiles became a reality in the 1950s with the development of accurate guidance systems and nuclear warheads. The necessity to combat these lethal, distance-ranging missiles gave birth to anti-ballistic missile research and development programs.

The 1960s saw the Union of Soviet Socialist Republic and the U.S. testing aspects of defensive systems, which were armed with nuclear warheads and directed by elaborate radar networks.

Enormous technical challenges of the day were coupled with political minefields. A debate raged between a requirement for national defense against perceived antagonists and the opposite position that an arms race of any kind, including defensive, increased the odds of a disastrous confrontation.

The first anti-ballistic missile system to emerge from the technological and political turmoil was the Nike-Zeus system. Elements of the system performed impressively in individual

tests, but an overall consensus emerged declaring the system to be impractical, due to its inability to discriminate between decoys and an actual threat, and other limitations such as where it could engage a target and how many separate targets could be tracked simultaneously. The project was cancelled in 1961.

The next system to step up to the plate was Project Defender, featuring missiles to be launched from platforms orbiting directly over the USSR. In response to fears raised over consequences attendant upon exploding nuclear warheads over friendly territory, this system would deploy huge wire meshes intended to disable Soviets ICBMs in the early launch phase. Difficulties surrounding the protection of the orbiting platforms scuttled the program in 1968.

Sentinel followed, with a goal of providing a defense against a limited nuclear strike, such as might be launched by the People's Republic of China. Politics and limited technology caused then-President Richard Nixon to freeze pending deployment of the system in 1969.

The Safeguard Program earned the distinction of being the only missile defense system actually to deploy and become operational, until the advent of today's Ground-based Midcourse Defense System. A scaled-down version of Sentinel, it was designed to defend U.S. ICBM sites against attack, rather than cities. It became operational in 1975, and was shut down in 1976, based on the vulnerability of its radars.

Concerns about using nuclear-tipped interceptors led to the development of a radically different concept embodied in the Homing Overlay Experiment. Instead of a nuclear explosion destroying an incoming missile, a Kinetic Kill Vehicle was designed to extend a structure similar to an umbrella skeleton

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Former Secretary of Defense Donald Rumsfeld looks on as SPC Russell Smith of the 49th Missile Defense Battalion (GMD) briefs his duties as a weapons operator. *Photo courtesy 100th MDB (GMD)*

which would destroy an ICBM re-entry vehicle on collision. Three test failures were followed by a success in 1986, destroying a Minuteman re-entry vehicle with a closing speed of about 6.1 km/s at an altitude of more than 160 km. The technology was absorbed into the Strategic Defense Initiative, next step in the developmental chronology.

President Ronald Reagan was the driving force behind SDI, which quickly became known as “Star Wars.” In response to Soviet first-strike capability, Reagan proposed a robust, multi-tiered system that would defend against an all-out attack, versus the limited scope of earlier programs. SDI involved Space-based laser battle stations, X-ray laser satellites and extremely sophisticated command and control systems.

Political debate waxed furious — with detractors questioning the program’s feasibility and whether the concept was strategically sound. SDI advocates prevailed, and, in 1984, the project was funded. The fall of the USSR, signaling the end of the Cold War, effectively removed the enemy the system was designed against, and momentum for progress in the ballistic missile defense arena collapsed.

The end of the Cold War, initially hailed as ushering in an era of lasting peace, soon devolved into rising fear of terrorism and rogue states that moved into the ‘threat status’ left vacant with the demise of the USSR. Uncertainty about the security of existing nuclear missile stocks and increasingly developed technology that made “suitcase bombs” a possibility created an entire new playing field in the 1990s and early 21st century. Missile defense goals of that time period segued into preventing the United States from

being subjected to nuclear blackmail or terrorism.

The first Persian Gulf War and the success, although limited, of Patriot missiles bringing down Scuds renewed interest in the “hitting a bullet with a bullet” concept. President Bill Clinton gave qualified support to continued development of such a system, saying in September, 2000, “an extra dimension of insurance in a world where proliferation has complicated the task of preserving the peace.”

Funding and emphasis, however, lagged, and development proceeded at a commensurate pace.

Then came the horrific events of Sept. 11, 2001, which, with a new “day of infamy,” proved conclusively to this generation of Americans that they too can be attacked on their home soil.

A presidential directive issued in December of 2002 by President George W. Bush required the nation to rapidly field a missile defense system. The directive, a direct response to the events of Sept. 11, effectively sped up the process for a system in development since the 1990s, but with roots in the “Star Wars” initiative of the Reagan years.

The system, now named the Ground-based Midcourse Defense System, is part of a concept of layered Ballistic Missile Defense, the latter which will eventually target threat missiles in all stages of their trajectory. The GMD portion of the system is aimed at destroying incoming missiles in Space during the midcourse of their flight, with an Exo-Atmospheric Kill Vehicle using non-nuclear kinetic warheads. The system is considered to be in “spiral development,” deployed while simultaneously being tested and improved.

On June 15, 2002, ground was broken for the



The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) is a tethered aerostat equipped with a sensor suite which includes surveillance radar and precision track and illumination radar. From its position above the battlefield, it provides detection and tracking capability of incoming cruise missiles allowing them to be engaged by surface-based air defense systems even before the targets can be seen by the system. The JLENS achieved the first live, over-the-horizon engagement using an elevated platform on April 4, 2000. The Forward Pass demonstration, which proved the joint interoperability of the system, also saw the first handover of a missile flight to an external radar to intercept a low-flying target. Image Courtesy SMDC Historical Office

Missile Defense Complex at Fort Greely, Alaska — home to future interceptors. The post was brought back from near extinction after a base realignment and closure. A small group of Soldiers began training on the system in Colorado Springs, Colorado, future location of the 100th Missile Defense Brigade (GMD).

A successful intercept was achieved by a ground based interceptor launched from the Ronald Reagan Ballistic Missile Defense Site in October 2002. It destroyed a mock warhead 225 km above the Pacific.

On Oct. 16, 2003, an activation ceremony was held at Peterson Air Force Base, Colorado Springs, Colorado that 'stood-up' the 100th. The brigade is staffed largely by active Colorado National Guardsmen in their time-honored role of defending the homeland. A nationwide hiring search drew the best qualified Soldiers from across America, who then became Colorado Guardsmen and women. A small contingent of Active Duty Soldiers makes the unit multi-component.

On Jan. 22, 2004, the 49th Missile Defense Battalion (GMD) was activated at Fort Greely. The battalion is completely staffed by Alaska National Guardsmen, hired in a similar nationwide search.

On July 22, 2004, the first interceptor was emplaced at Fort Greely, and on Dec. 10, 2004, an interceptor was emplaced at Vandenberg Air Force Base, Calif. — the first for this location, which would be primarily used for testing.

Since 2002, the U.S. has been discussing the possibility of building a third missile site in Europe, which would enable defense against different missile trajectories than those provided by Alaska and California. Talks are, today, ongoing.

Two failed interceptor tests, in 2004 and 2005, were due to anomalies and support malfunctions, rather than the concept or main technology of the system. The failures fueled

detractors of the program, who are legion, as was historically the case with all such systems.

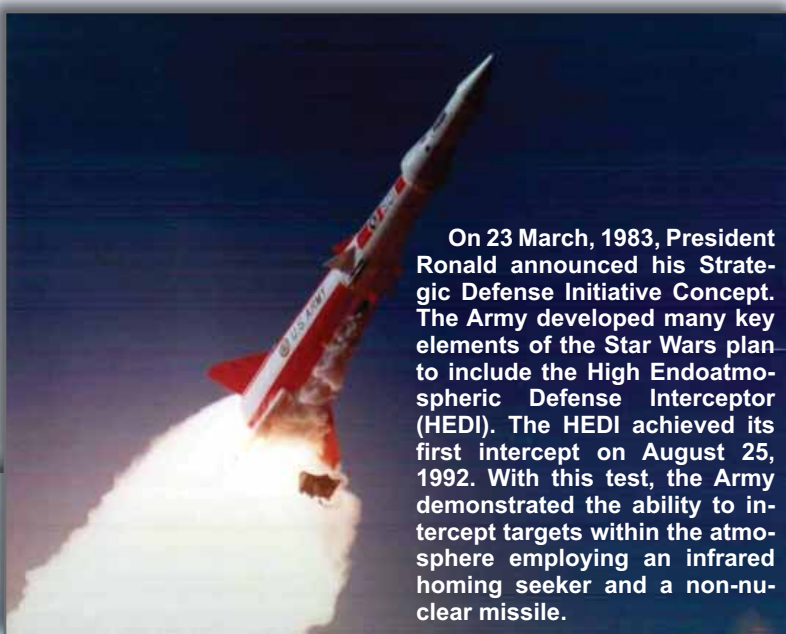
The summer of 2006 was fraught with high-level political tension, as North Korea advertised their plan to test a long-range ballistic missile, in defiance of world opinion. In July, the ground-based midcourse system was brought to full operational status in response. The Korean launch of July 4 failed, but the Soldiers and interceptors of the nation's missile defense system were ready to perform as they had been trained and designed to do.

On Sept. 1, 2006, an interceptor launched from the California site successfully intercepted and destroyed a target launched from Kodiak, Alaska.

The future of Ballistic Missile Defense will/may include the integration of sea-based, Space-based, laser and high altitude missile systems. Each military service has a role in its deployment, from satellites and radars, through the sea-based Aegis Ballistic Missile Defense System. The current limited defensive capability of the Ground-based Midcourse Defense System is a beginning...

Today, the 100th Missile Defense Brigade (GMD) stands ready, proud and able to defend the United States against ballistic missile attacks.

MAJ Laura Kenney is an Active Guard Reservist serving as the public affairs officer for the U.S. Army Space and Missile Defense Command/ U.S. Army Forces Strategic Command's 100th Missile Defense Brigade (Ground-based Midcourse Defense) in Colorado Springs, Colo. She served five years active duty as an enlisted journalist with Air Defense Command in Germany. As a commissioned Reserve officer, she performed public affairs in the Gulf War theater and served as deputy public affairs officer for the American sector in Kosovo in 2001. She volunteered for active duty after Sept. 11, 2001, and served three years in the SMDC/ ARSTRAT public affairs office before moving to the 100th Missile Defense Brigade (GMD).



On 23 March, 1983, President Ronald announced his Strategic Defense Initiative Concept. The Army developed many key elements of the Star Wars plan to include the High Endoatmospheric Defense Interceptor (HEDI). The HEDI achieved its first intercept on August 25, 1992. With this test, the Army demonstrated the ability to intercept targets within the atmosphere employing an infrared homing seeker and a non-nuclear missile.



On September 28, 1975, the Stanley R. Mickelsen SAFE-GUARD Complex reached full operating capability with the deployment of 30 SPARTAN and 70 SPRINT missiles. The SPRINT was a short-range, nuclear-tipped, interceptor designed to provide terminal defense on any azimuth. The SPRINT presents significant accomplishments in valve technology, propellant, heat shields, shock proofing and hardening.



Above, the SAFEGUARD System constructed near Grand Forks, N.D., the only deployed antiballistic missile system in the Western World, also included two radars — the Perimeter Acquisition Radar and the Missile Site Radar (MSR). The pyramid shaped MSR served many functions to include surveillance and limited discrimination, re-entry target tracking, and track and command guidance to the SPRINT and SPARTAN missiles. With the ratification of the Anti-Ballistic Missile Treaty, Congress ordered the deactivation of the Safeguard Complex. It closed in February 1976 after being operational for less than four months. *Images Courtesy SMDC Historical Office*

Right, missile defense system operators continually train on the ground-based midcourse defense system, maintaining a high level of proficiency on the system designed to protect the United States. *Photo courtesy 100th MDB (GMD)*



On the cover, clockwise from top left, The Homing Overlay Experiment consisted of a series of four missile intercept tests conducted in 1983 and 1984 at Kwajalein Missile Range, in the Marshall Islands. The HOE tests proved that it was literally possible to hit “a bullet with a bullet.” The radial net of the HOE would unfurl like the spokes of an umbrella to destroy the incoming warhead. The first such intercept of an Intercontinental Ballistic Missile in the exoatmosphere using only kinetic energy occurred on June 10, 1984. The Homing Overlay Experiment (HOE) was designed to destroy an incoming warhead by direct impact versus detonation.

The Army began to address national missile defense in the 1950's with the NIKE-ZEUS project. The Zeus Acquisition Radar (ZAR), the first track-while-scan radar, was but one element of this intricate network of seven radars and the ZEUS interceptor. In addition to the ZAR, the system included two Target Track Radars, a Discrimination Radar, and three Missile Track Radars. *Images Courtesy SMDC Historical Office*

The first ground-based interceptor, a multi-stage silo-launched booster rocket and kill vehicle that will track and destroy high-speed ballistic missiles in their midcourse phase, is emplaced at Fort Greely, Alaska July 22, 2004. *Photo courtesy 100th MDB (GMD)*