Braving the frigid temperatures of 40 below zero, Brig. Gen. James W. Nuttall, deputy director of the Army National Guard, descends into a Silo Interface Vault on the Missile Defense Complex on Fort Greely.

Deputy director of National Guard Bureau visits 49th Missile Defense Battalion

Story and photos by
Sgt. Jack W. Carlson III
Unit reporter

FORT GREELY, Alaska -- Brig. Gen. James W. Nuttall, deputy director of the Army National Guard, visited Soldiers of the 49th Missile Defense Battalion (Ground-based Midcourse Defense) and their families here Jan. 9.

Upon arriving, Nuttall was greeted not only by the senior leadership of Fort Greely but also some of the coldest temperatures recorded for the year. With overnight lows at 48 below zero, Nuttall wanted to experience what Soldiers on the ground go through on a day-to-day basis.

"I intentionally chose to come here at this time of the year; it will help me truly understand what Soldiers have to endure during the winters here," Nutall said.

Once on the ground, the deputy director attended multiple briefings on the status of the missile defense programs, the Fort Greely Garrison, and the accomplishments of the 49th. The Battalion Family Readiness Group (FRG) also briefed Nutall over lunch, highlighting the role of the FRG in the Battalion.

"Clearly the 49th must be considered a forward deployed unit ... we have a capability and families on the ground; this is a large step forward from the unit's inception," Nuttall said when speaking to Soldiers and family members.

Following the lunch, Nuttall was escorted onto the Missile Defense Complex where he climbed down into a Silo Interface Vault, toured the Missile Assembly Building, and was shown a training run on the GMD Systems Trainer.

The GST trains warfighters at the battalion with high fidelity simulations to train and practice conducting missile defense battle drills against a limited Intercontinental Ballistic Missile threat.

"It is obvious that this is no longer an initial capability, we are now operational and the National Guard will be sustaining this mission for years to come," Nuttall said.

HELSTF – Home of the MIRACL and THEL Laser Systems

By Mark Hubbs
SMDC/ARSTRAT Historical Office

Although the High Energy Laser Systems Test Facility is known for cutting edge laser development and testing, the site's history began long before the days of laser technology.

In 1960, the Army began to develop phased controlled scanning radars, what we call now "phased array radars." The Army Rocket and Guided Missile Agency (ARGMA), the parent organization for the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command's predecessor unit the Nike-Zeus Project Office, began construction of the Multifunction Array Radar (MAR) prototype at White Sands Missile Range, N.M., in 1963.

The success of the MAR and the testing at WSMR provided a great deal of data that was used to refine the technology later used in the Perimeter Acquisition Radar, deployed as part of the SAFEGUARD anti-ballistic missile system. The MAR continued testing until 1969 when operations ceased, and it went into caretaker status.

In 1974, Congress directed the Department of Defense to create a "national" tri-service high energy laser facility to consolidate equipment and work conducted at various government and contractor facilities.

The command's former Multifunction Array Radar site at WSMR was chosen in 1981 as the new HELSTF facility. The steel shielding and extensive below ground space in the MAR lended itself well for conversion to this new endeavor. The mission of the HELSTF was to support DoD laser research, development, test and evaluation. It was also to integrate and operate lasers and related instrumentation, facilities, and support systems and to conduct and evaluate the effect of lasers on materials and weapons.

The MIRACL was the first megawatt-class, continuous wave, chemical laser built in the free world. It along with the Sea Lite Beam Director (SLBD) had originally been developed by the Navy and was transferred to HELSTF in 1984.

The MIRACL is a deuterium fluoride chemical laser with the highest continuous power output yet achieved by any U.S. laser. The laser is almost like a rocket engine designed to produce an optically uniform downstream flow field as a lasing medium. An oxidizer is reacted with a fuel mixture and ignited in its combustor to produce fluorine. Deuterium is then injected into the flow to chemically combine with the fluorine atoms and produce excited deuterium fluoride molecules upon which the lasing is based.

The HELSTF became operational on Sept. 6, 1985, when the MIRACL-SLBD was used for an Air Force lethality test where it lased and destroyed a Titan missile booster. MIRACL-SLBD operations continued with more demanding tests, including the first test against a dynamic target when an Air Force aircraft drone was destroyed in flight on Sept. 2, 1987.

At the direction of the secretary of the Army, responsibility for HELSTF passed from the Army Materiel Command to the U.S. Army Strategic Defense Command (USASDC) on Oct. 1, 1990. USASDC was chosen in a desire to consolidate Army strategic test facilities under one command (USASDC already managed Kwajalein Missile Range).

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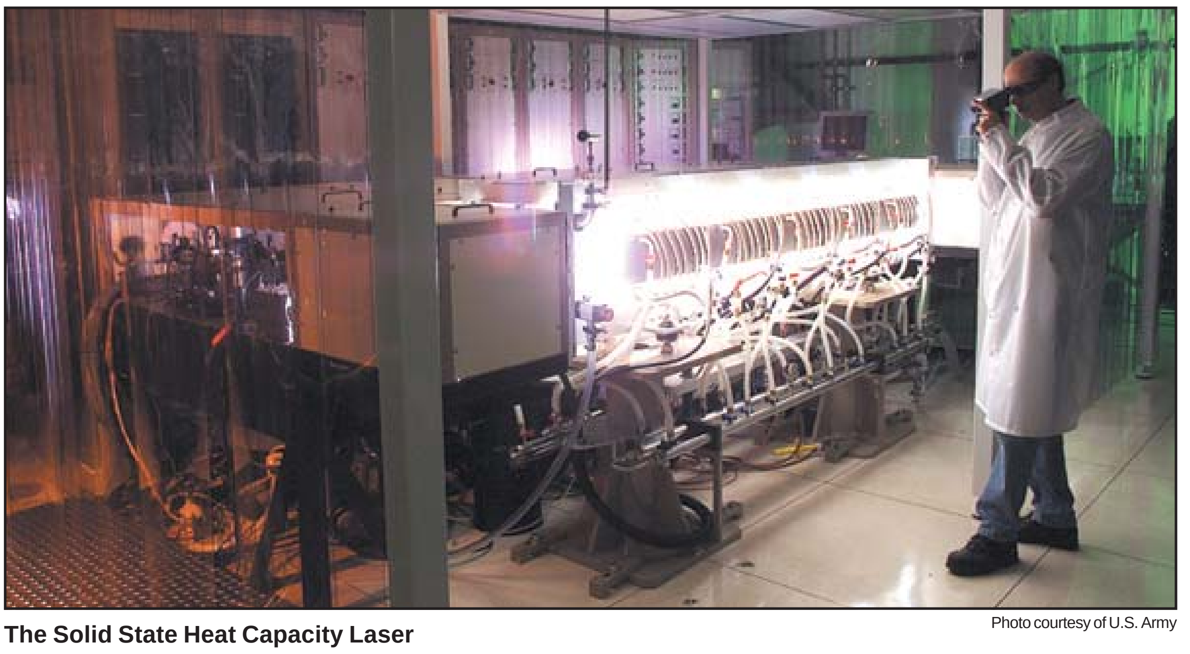


Photo courtesy of U.S. Army

The Solid State Heat Capacity Laser

Directed Energy … Where did we begin?

By Sharon Watkins
SMDC/ARSTRAT Historical Office

In 1983, President Ronald Reagan announced his Strategic Defense Initiative (SDI). It was soon derided by opponents who saw the use of innovative directed energy technologies as nothing more than the stuff out of "Star Wars."

Even before George Lucas' film achieved unprecedented success at the box office, however, the Ballistic Missile Defense Advanced Technology Center, a U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) predecessor, had already begun to explore the potential of directed energy — neutral particle beams and lasers — in both sensor and interceptor applications.

The Army began to research neutral particle beam (NPB), then known as high energy beam, technology in 1974. Both endo- and exo-atmospheric options were initially considered for a potential NPB system. Proof of principle experiments were conducted in 1980 and the space-based concept was ultimately selected for further development.

In the 1980s, the NPB was incorporated into the SDI architecture. An NPB would deliver the neutral hydrogen atoms at near the speed of light to penetrate the target and disrupt or destroy the electronic circuits and/or ignite the warhead.

The program continued to progress and in 1989 Beam Experiments Aboard a Rocket program demonstrated the capability of an accelerator to operate outside the atmosphere and in 1993, the NPB completed its final demonstration program. At the same time, the deployment concept for missile defense was redefined and reducing funding for several programs including Directed Energy. These factors tied to issues related to the required size and weight of the NPB end product and resulted in the redirection of DE efforts toward laser technology.

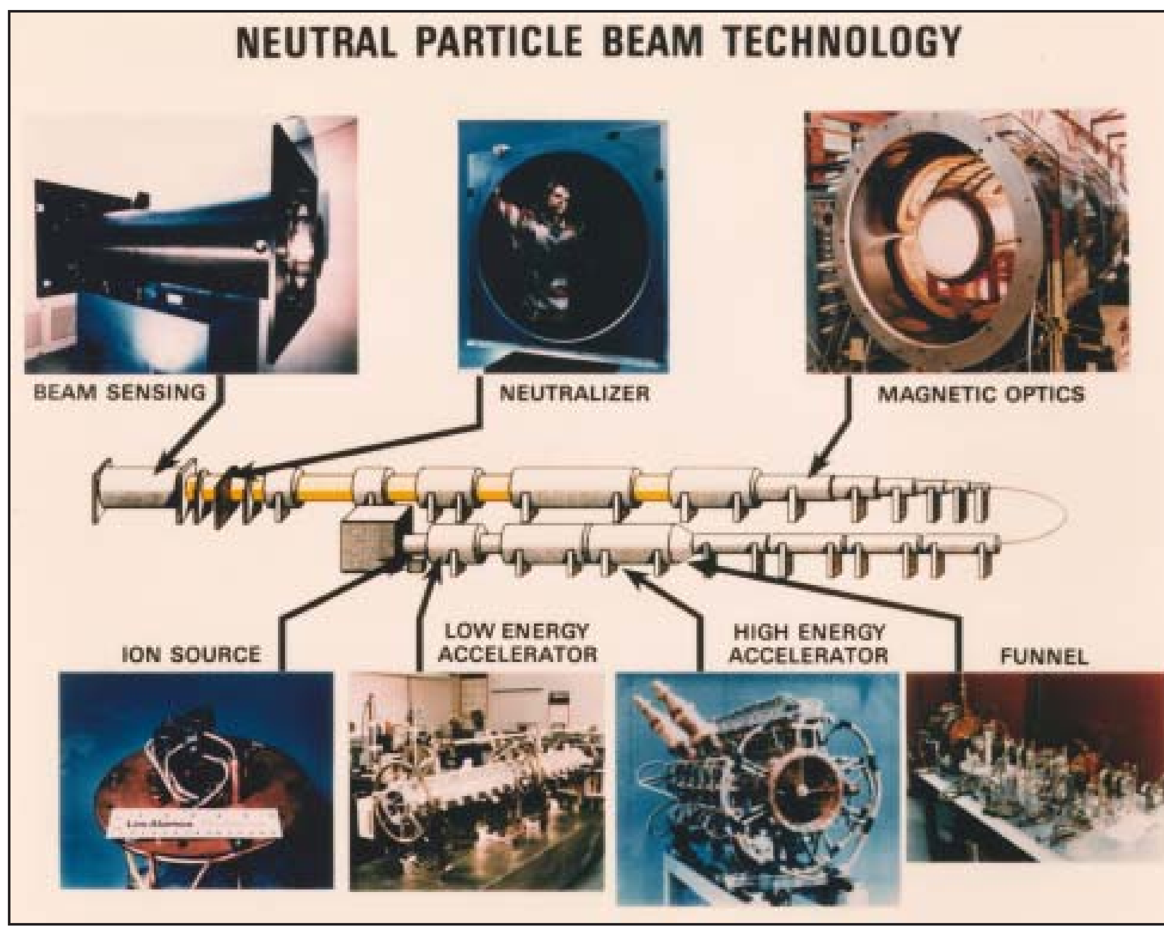
The command also initiated its laser research programs in the early 1970s. These early programs explored the feasibility of laser radar or ladar technology, the lasers sensors. Products which employ these types of technologies have since become a common feature in our world. A separate study begun at the same time addressed the development of BMD laser systems for the post-boost, midcourse and terminal defense.

By the end of the decade researcher had demonstrated that lasers could work in conjunction with pointing and tracking devices to form an effective weapons system.

In 1986, the command's largest directed energy program was the ground based free electron laser (FEL) technology integration experiment. As part of the SDI architecture, the goal was to develop a system, either radio frequency or induction FEL, that could intercept a missile in the boost phase or a satellite by bouncing a laser beam off relay mirrors in space.

As a result of repeated budget cuts the GBFEL facility was closed soon after it opened. Despite this set-back, high energy laser research has continued at SMDC. The successes are well known — the High Energy Laser Systems Test Facility's, or HELSTF's, satellite lethality experiment and subsequent Data Collection Exercise, the MIRACL's successful intercepts, the Theater High Energy Laser and its mobile successor, and the ZEUS laser neutralization system.

In 2001, Lt. Gen. John Costello, the USASMDC commander, observed that "directed energy technology has the potential to be a key component in the Army transformation effort." To enhance these resources, the Command and the Department of the Energy signed an agreement to support an Army Directed Energy Center of Excellence at USASMDC. This new mission was not born by happenstance, the foundation for the agreement was laid three decades earlier.



Courtesy photo

The proposed space-based neutral particle beam would shoot an unbendable beam of hydrogen molecules at approximately 60,000 kilometers per second to disrupt the electronics and warhead of an incoming missile.

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Since then the command has continued to offer the MIRACL-SLBD's testing capability to various military and academic programs. Tom Hodge, the current HELSTF director, describes the MIRACL as "the workhorse of military laser research."

As laser test customers developed requirements, the Army and later the command added to the suite of laser test facilities and systems at HELSTF.

The first, constructed in 1988, was the Large Vacuum Chamber. It is a 50-foot diameter sphere shaped chamber that can produce vacuums equivalent to 650,000 feet in altitude. It is the only vacuum chamber that can expose targets to a high energy laser beam while in a vacuum environment.

On Aug. 22, 1991, the first full scale satellite lethality experiment using a high energy laser was successfully completed with the MIRACL laser. This test verified the effects of high energy lasers on prospective targets, permitting accurate determination of the size and power required for a Directed Energy Anti-Satellite weapon system.

The Pulsed Laser Vulnerability Test System (PLVTS) is another HELSTF asset which has been in operation since 1992. The PLVTS is a pulsed CO2 laser and beam director that is used to replicate threat tactical laser systems to support vulnerability testing of U.S. military weapons and system components.

The MIRACL system again performed a world "first" when it successfully tracked, engaged and destroyed a katyusha rocket in flight. This success led to the development of the Tactical High Energy Laser (THEL) that was tested on a variety of air-borne targets from 1999 to 2004. (See "Science Fiction Becomes Reality" on page 20.)

HELSTF has been testing a Solid State Heat Capacity Laser (SSHCL) since August of 2001. The SSHCL device, built by Lawrence Livermore National Laboratory, is the most powerful device of its kind in the world. At 10 kilowatts of power, the SSHCL has only 10 percent of the power it needs to match the destructive power of the THEL. However its small size and all electric operation offer battlefield mobility that cannot be duplicated by a chemical laser such as the THEL. Researchers are confident that the SSHCL technology can eventually produce the 100 kilowatts required to shoot-down enemy rockets at realistic combat ranges.

HELSTF is modernizing its facilities and infrastructure to keep pace with ever changing military. The location of HELSTF at WSMR provides access to more than 5,000 square miles of highly instrumented land space and 7,000 square miles of controlled airspace for high energy laser testing. The wide array of laser systems, instrumentation, and test facilities currently in use makes HELSTF a unique national asset.