



THE WARRIOR

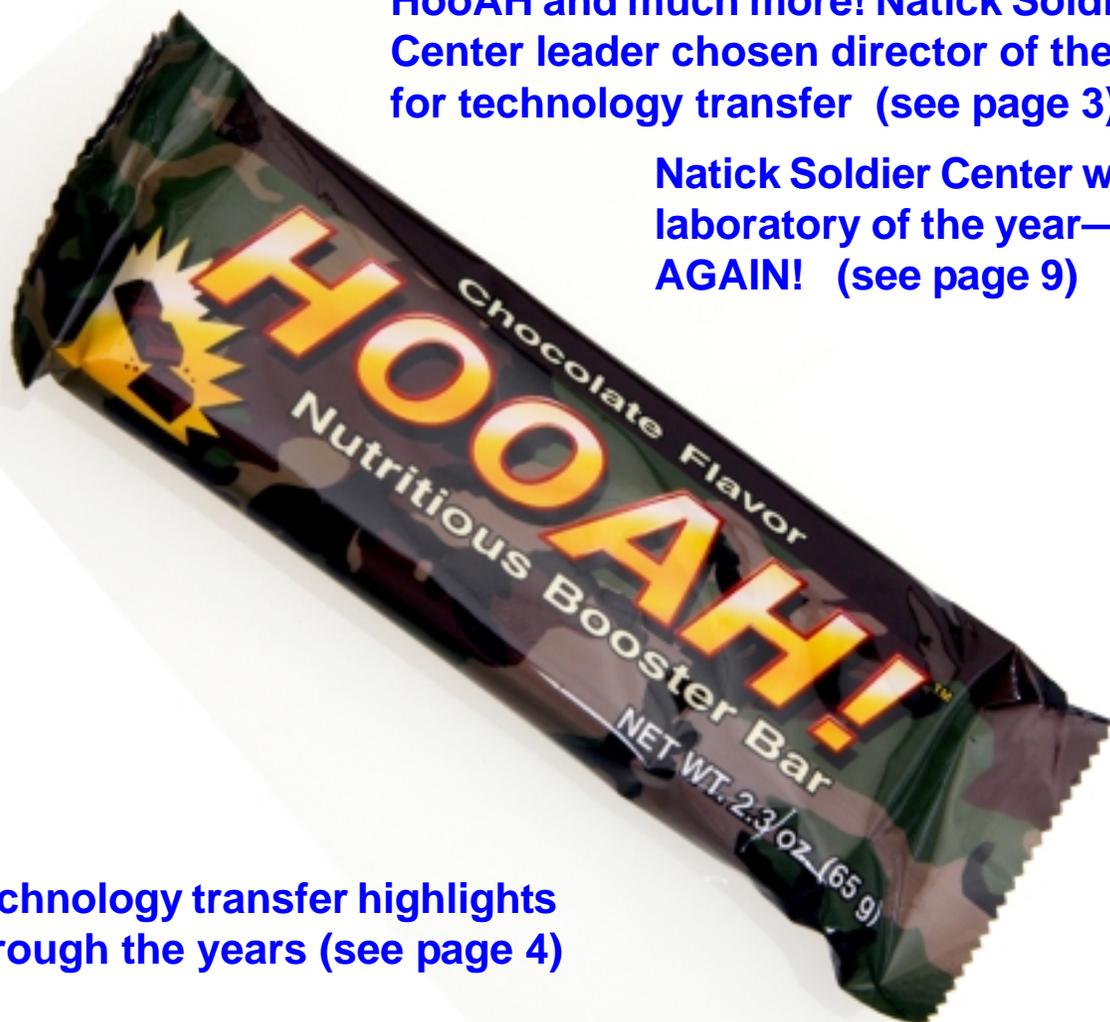
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January-February 2006

We have a winner!

HooAH and much more! Natick Soldier Center leader chosen director of the year for technology transfer (see page 3)

Natick Soldier Center wins laboratory of the year—AGAIN! (see page 9)



Technology transfer highlights through the years (see page 4)

Flame-resistant clothing gets more comfy (see page 8)

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Natick Soldier Center chosen lab of the year



Warrior/Underhill

Cover photo: The HooAH bar is just one of many products and technologies developed by the Natick Soldier Center (NSC) and transferred to the commercial sector. Philip Brandler, director of NSC, has been chosen director of the year by the Federal Laboratory Consortium for his outstanding contributions in supporting technology transfer activities.



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And the award for best director goes to...

Philip Brandler wins laboratory director of the year

Philip Brandler, director of the Natick Soldier Center (NSC) located at the U.S. Army Soldier Systems Center in Natick, Mass., has been chosen a 2005 Laboratory Director of the Year. The award is given by the Federal Laboratory Consortium (FLC) for Technology Transfer, and is open to more than 700 federal research and development laboratories and centers nationwide.

Brandler was recognized for his exemplary contributions in supporting technology transfer activities at the NSC. He has enabled the transfer of technologies through Cooperative Research and Development Agreements (CRADAs), Patent Licensing Agreements (PLAs), other formal and informal partnerships, and consortia.

Technology transfer is an integral part of the NSC's mission to conduct research, development, testing and evaluation focused on maximizing the individual Soldier's survivability, combat effectiveness and quality of life in the field.

NSC participates currently in 53 active CRADA collaborations and nine PLAs. One of these active collaborations includes a CRADA with a company that allows for the licensing of the HooAH Bar logo for commercial use. The HooAH Bar is a nutrition bar that increases energy and improves performance. The licensing agreement has brought funding into the NSC that is used to achieve further improvements to DoD Combat Rations.

Another collaboration involves a PLA allowing the Modular Lightweight Load-carrying Equipment (MOLLE) system to be licensed to private industry. The MOLLE is a load-carriage system that consists of a rucksack and vest with removable compartments, components, and pockets. The PLA has brought funding into the NSC for continued product development.

Under Brandler's leadership, the NSC was the recipient of two 2005 FLC Excellence in Technology Transfer Awards.

One of these awards was for High Pressure Food Processing (HPP), which has already been adopted by the food industry. HPP uses pressure to provide safe, minimally processed foods with extended shelf life while better preserving taste, texture and nutritional value than traditional heat-processing methods.

The other Technology Transfer Award was for inflatable composite structures used by the military and commercial sectors. Some of the applications for this technology include arches to support large, portable, aircraft maintenance shelters, inflatable wheels and antennas for space applications, and stiffening edges for large-cargo parachutes.



Warrior/Underhill

Philip Brandler, director of the Natick Soldier Center, has been chosen a 2005 Laboratory Director of the Year by the Federal Laboratory Consortium (FLC) for Technology Transfer.

***“While I am naturally honored to receive the award, I regard it more as a tribute to the exceptional efforts and commitment of the scientists and engineers at the Natick Soldier Center.”
Philip Brandler, director, Natick Soldier Center.***

Brandler attributes NSC's success to his high-quality work force. "While I am naturally honored to receive the award, I regard it more as a tribute to the exceptional efforts and commitment of the scientists and engineers at the Natick Soldier Center. They not only develop, independently and in collaboration with others, innovative technologies useful to the Soldier and to first responders, but also take those technologies that important next step forward to transition it so that it becomes an item being produced by industry and fielded," said Brandler.

In 2005, NSC was also selected as the Department of the Army Research and Development Laboratory of the Year (Small Development Lab Category).

Under Brandler's direction, NSC has prevailed in the Small Development Lab Category three years consecutively and has won the award for four out of past five years. The award is the most prestigious bestowed by the Army upon a research and development organization.

Brandler has been Natick Soldier Center director since 1994. Previously, he has held positions at the National Aeronautics and Space Administration (NASA), Air Force Research Labs, Massachusetts Institute of Technology and industry. He has advanced degrees in physics, industrial engineering/operations research and business administration.

NSC technology transfer highlights through the years

Over the years, Natick Soldier Center (NSC) has researched, developed, and/or co-sponsored numerous technologies and products that have both military and commercial applications. The following highlights cover some, but nowhere near all, of NSC's technology transfer achievements throughout the years. (Editor's note: Thanks to NSC personnel for contributions to this article.)

Clothing and Individual Equipment

Fibers and Textiles

Gore-Tex. Gore-Tex is a W. L. Gore thin film product that has strong origins in military cold weather clothing development. NSC and W. L. Gore worked in close collaboration to develop this film that is laminated to textile material to create one of the best environmental protection items in wet and cold environments.

Primaloft. NSC, under a contract with Albany International, developed Primaloft, a synthetic (polyester), hypoallergenic alternative to down which provides superior insulation. Primaloft overcomes the deficiencies of down, including moisture retention and loss of insulating value.

Electro Textiles. Land's End and Malden Mills collaborated to use NSC-developed "power buss" technology to power wireless, electric blankets, which have already been introduced to the commercial marketplace. NSC is currently providing assistance and technology to the wearable-computer company, Xybernaut, to produce a data and power conductive network system. The system will be integrated into textile materials and will eliminate the need for surface wiring now being used with such systems.

Textile Treatments

Quarpel. Quarpel water-repellent is a water and stain resistant textile treatment that was developed by Natick Research Laboratories in the late 1960s for use in combat clothing and equipment. "Quarpel" is an acronym for "Quartermaster Repellent" that was coined by the Natick scientist inventor. The water repellent is still used commercially in top clothing lines and is used in many other commercial items such as upholstery and carpeting. The military uses Quarpel extensively in rain protective combat clothing and equipment. The repellent has the unique capability to repel water and organic liquids, such as chemical warfare agents, and withstands repeated laundering.

Permethrin applied to clothing for insect protection. Permethrin is an agricultural-based product that the military adopted for treatment of textile materials for protection against flying insects. NSC developed the application methods for spraying Permethrin onto clothing.



Warrior/Underhill

This Soldier enjoys a HooAH Bar, one of the many high-quality products developed by the Natick Soldier Center's DoD Combat Feeding Directorate and transferred to the commercial market.



Warrior/Underhill

The Shelf Stable Pocket Sandwich, developed by Combat Feeding, has commercial applications as a lightweight, nutritious meal that requires no preparation and has a three-year shelf life at 80 degrees F.

Combat Feeding—Rations

MRE Pouch Bread (a shelf stable bread). The MRE Pouch Bread is shelf stable for up to eighteen months at 80 degrees F with the sensory qualities of fresh baked bread. NSC and several commercial baking firms conducted extensive studies to develop processes to improve bread quality.

Shelf Stable Pocket Sandwich. Developed by NSC's DoD Combat Feeding Directorate, the Pocket Sandwich has a three-year shelf life at 80 degrees F and has strong military and commercial applications.

HooAH Bar. Developed by Combat Feeding, the HooAH Bar is a nutrition bar that increases energy and improves performance and endurance. The HooAH Bar is available for military or commercial use.

Energy Rich, Glucose Optimized (ERGO) Drink. Developed by Combat Feeding, the ERGO drink is a primary source of carbohydrates and helps provide extra energy when taken before and after periods of intense activity.

Food Processing and Packaging Technologies

Food irradiation. During irradiation, foods are exposed to electron beams or cobalt gamma rays. The process kills bacteria by briefly altering the electric charge of the molecules in the food and microorganisms. Food irradiation increases food safety and shelf life. Irradiated foods are more nutritious and better tasting than foods processed with other methods. Food irradiation is used in the commercial sector as a means of preserving food. NSC has a long history of producing irradiated foods for the space program and pioneered irradiation in the 1960s.

High pressure processing. High Pressure Processing (HPP) uses pressure to provide safe, minimally processed foods with extended shelf life while better preserving taste, texture and nutritional value than traditional heat-processing methods. Developed by NSC, academia and industry, the process has been adopted by the commercial food industry.

Restructured food items (meats). Development of restructured meats was pioneered through research efforts at NSC. These items are used in the commercial sector as a means of providing quality meats at a reduced price by using low grade cuts of meat and poultry.



Combat Feeding's tube foods provide nourishment during high-altitude flights. In the early 1960s, tube foods were also eaten by astronauts wearing pressurized space suits during the Mercury space flights.

***Food Processing and Packaging Technologies
(continued)***

Compressed food items. Developed by Combat Feeding, compressed food items are used as components of military rations and are also used in the commercial sector, particularly for foods eaten while hiking and camping where reduced volume is desirable.

Tube foods. These are shelf stable foods that are packaged in toothpaste-like tubes suitable for through-the-mask feeding. The military application for tube foods, which were developed by Combat Feeding, is for high altitude flights when aircrew must wear pressurized suits and breathe pure oxygen.

Retort pouch. Researched by NSC, the retort pouch is a flexible food pouch used in lieu of the traditional metal can for storing shelf stable thermally processed foods. The pouch has both military and commercial applications and has been transitioned to the international commercial sector.



Warrior/Underhill

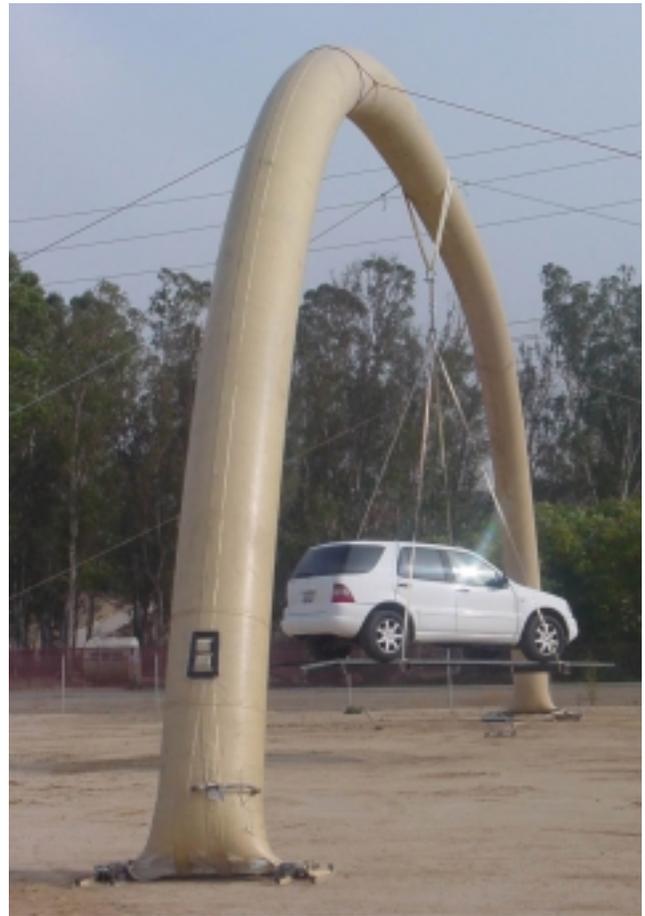
Pouch Bread, developed by Combat Feeding, provides Soldiers in the field with a high-quality alternative to fresh bread in situations where fresh bread is unavailable. The bread has made its way to the commercial marketplace.

Shelters

Braided and Woven Airbeam Technology for Shelter Systems. NSC developed two novel textile technologies, braided and woven, for producing seamless, inflatable airbeams. Airbeam technology allows for strong, lightweight, quickly erectable, highly mobile shelters that have both military and nonmilitary uses.



Courtesy photo



Courtesy photo



Courtesy photo

The strong, lightweight, mobile braided airbeam shelters can be put up quickly and have been used during hurricane relief efforts.

Where there is a wool, there is a way

Natick Soldier Center is working with American Sheep Industry Association to develop new flame-resistant fabrics

By Jane Benson
Editor

The Natick Soldier Center (NSC) is working with the American Sheep Industry Association (ASI) and the American Wool Council (AWC) to develop a family of new woolen, flame-resistant products, including woven and knitted fabrics.

According to NSC textile technologist, Carole Winterhalter, NSC, AWC and ASI have developed a woven wool/aramid fabric, which features a camouflage print. Winterhalter said that the fabric is suitable for combat uniforms and other protective clothing.

Winterhalter said the woven fabric provides a low-cost alternative to existing military flame-resistant fabric, is washable, and provides flame protection and camouflage protection.

As a follow-on effort, NSC, AWC and ASI are also working on a new knitted flame-resistant fabric that will be 50 percent wool and 50 percent aramid. The knitted version will be used in underwear, hand wear and headwear.

Since underwear, hand wear, and headwear directly touch the skin, adding wool to aramid will increase comfort while maintaining the thermal protection provided by the currently used 100 percent aramid fabric. The blend will also cost less than the aramid fabric.

The fabrics will have nonmilitary applications as well, said Winterhalter. The fabrics can be used by first responders, firefighters, and industrial workers for flame protection.

The woven version will be soon subjected to a field evaluation and will be available to Soldiers later this year.



Photo courtesy of *Sheep Industry News*, American Sheep Industry

Sheep wool blended with aramid will make flame-resistant clothing more comfortable than clothing made from aramid alone.



Warrior/Shannon Canty

This firefighter participates in a force protection exercise at the U.S. Army Soldier Systems Center. In the future, new flame-resistant fabrics--developed for the military by the Natick Soldier Center, the American Sheep Industry Association and the American Wool Council--may be used by firefighters, first responders, and industrial workers for flame protection.

Lab adored!

Natick Soldier Center named lab of the year (again!)

By Jane Benson
Editor

The Natick Soldier Center (NSC), located at the U.S. Army Soldier Systems Center in Natick, Mass., has won the 2005 Department of the Army Research and Development Laboratory of the Year Award (Small Development Lab Category).

NSC has prevailed in the Small Development Lab Category three years consecutively and has won the award for four out of the past five years. The award is the most prestigious bestowed by the Army upon a research and development organization.

The Army mission of the NSC is to “maximize the Warrior’s survivability, sustainability, mobility, combat effectiveness and quality of life by treating the Warrior as a system.” NSC’s vision is to be “the recognized center and partner of choice for Warrior and homeland defender related research, technologies and systems.”

A panel of science and technology experts chose the winners by evaluating extensively the organization’s vision, strategy and business plans; strategic management of human capital; competitive sourcing; improved

financial performance; use of expanded electronic government; budget and performance integration; major management achievements; and major technical achievements.

According to Philip Brandler, director of the NSC, “This success is unparalleled and reflects the sustained top-notch performance and the exceptionally high caliber of the NSC workforce.”

Natick Soldier Center’s trailblazing advances in biomechanics were submitted as its most significant technical accomplishment.



Courtesy photo

A human research volunteer crawls under a simulated barbed-wire obstacle wearing a rucksack. The Natick Soldier Center works in conjunction with the U.S. Army Research Institute of Environmental Medicine in the installation’s Biomechanics Lab.



Warrior/Underhill

The biomechanics work done by Natick Soldier Center (NSC) and U.S. Army Research Institute of Environmental Medicine helps increase Soldier mobility while reducing injuries. NSC is considered the leading expert on the biomechanics of Soldier tasks.

The lab received additional recognition as well. NSC, in partnership with the U.S. Army Research Institute of Environmental Medicine (USARIEM) and the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC), also received the Army Laboratory Collaboration Award for providing microclimate cooling for the Up-Armored High-Mobility Multipurpose Wheeled Vehicle (HMMWV) occupants, marking the first time that NSC won this team award. The NSC/USARIEM/TARDEC effort met an urgent battlefield requirement.

In a personal note, a helicopter pilot in Iraq emphasized the importance of microclimate cooling to aviators:

"I wanted to thank you and everyone else that had a part in getting us the Microclimate Cooling System. I just got back from my first flight with it a couple of hours ago. We flew 5.5 hours in 120 degrees and it worked awesome. The crew agreed this system is the best thing we've done for the helicopter since we put a rotor on it!!! The system greatly enhances the crew's

comfort and significantly reduces fatigue. I flew a similar mission two days ago w/out the system and I can personally attest that the heat is becoming our most dangerous threat. Without the system, after only a couple hours of flying you find yourself fatigued and droning. Whereas today, the crew was as fresh after 5.5 hours as when we first strapped it on. Bottom line: This is an awesome system that greatly reduces the risks levels to our Soldiers over here. Again thank you all for your support; it is making a difference in the fight!"

The NSC, USARIEM and TARDEC microclimate cooling collaboration was one of the numerous NSC contributions to the Global War on Terrorism and Homeland Security. In this area, NSC also contributed several Soldier protection systems, including body armor and face shield prototypes as well as protective shelters.

The NSC made several other contributions to the Warfighter. NSC submitted the Army Combat Uniform as its most significant management accomplishment. The uniform came about as a result of an innovative management acquisition concept that used industry teams in nonstandard ways and eased communication between all key stakeholders. The integrated product team was made up of members from government, industry, and academia and included textile and component suppliers, apparel researchers, and Soldiers.

The Natick Soldier Center, working with the U.S. Army Research Institute of Environmental Medicine, addressed the issue of heavy load carriage, an on-going problem for Soldiers.

The streamlined acquisition management process reduced the development cycle from more than three years to one year. The initial fielding took place within six months after the final design approval was received from the Army Chief of Staff.

NSC's trailblazing advances in biomechanics were submitted as its most significant technical accomplishment. The lab's biomechanics work combines the disciplines of biology, physics and engineering, analyzes the effect of forces and torques on the human body, and quantifies human-equipment interactions in performing physical tasks.

NSC, working with the U.S. Army Research Institute of Environmental Medicine (USARIEM), addressed the issue of heavy load carriage, an ongoing problem for Soldiers, with the average approach march load being 101 pounds and the maximum emergence approach march load equaling 149 pounds.

The research provides for improved equipment design that enhances Soldier effectiveness by reducing potential injuries and reducing energy expenditure.

NSC biomechanics research has set the stage for work with the Military Amputee Research Program and the Defense Advanced Research Projects Agency's (DARPA) exoskeleton programs.

In the future, NSC plans to continue efforts to both save and improve the lives of the nation's Warfighters and Homeland Security/Homeland Defense first responders.

The Natick Soldier Center (NSC), the U.S. Army Research Institute of Environmental Medicine (USARIEM) and the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC) microclimate cooling collaboration was one of the numerous NSC contributions to the Global War on Terrorism and Homeland Security.



The Natick Soldier Center (NSC), in partnership with the U.S. Army Research Institute of Environmental Medicine (USARIEM) and the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC), received the Army Laboratory Collaboration Award. This was the first time NSC won this team award, which was given for providing microclimate cooling for the Up-Armored High-Mobility Multipurpose Wheeled Vehicle (HMMWV) occupants.



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