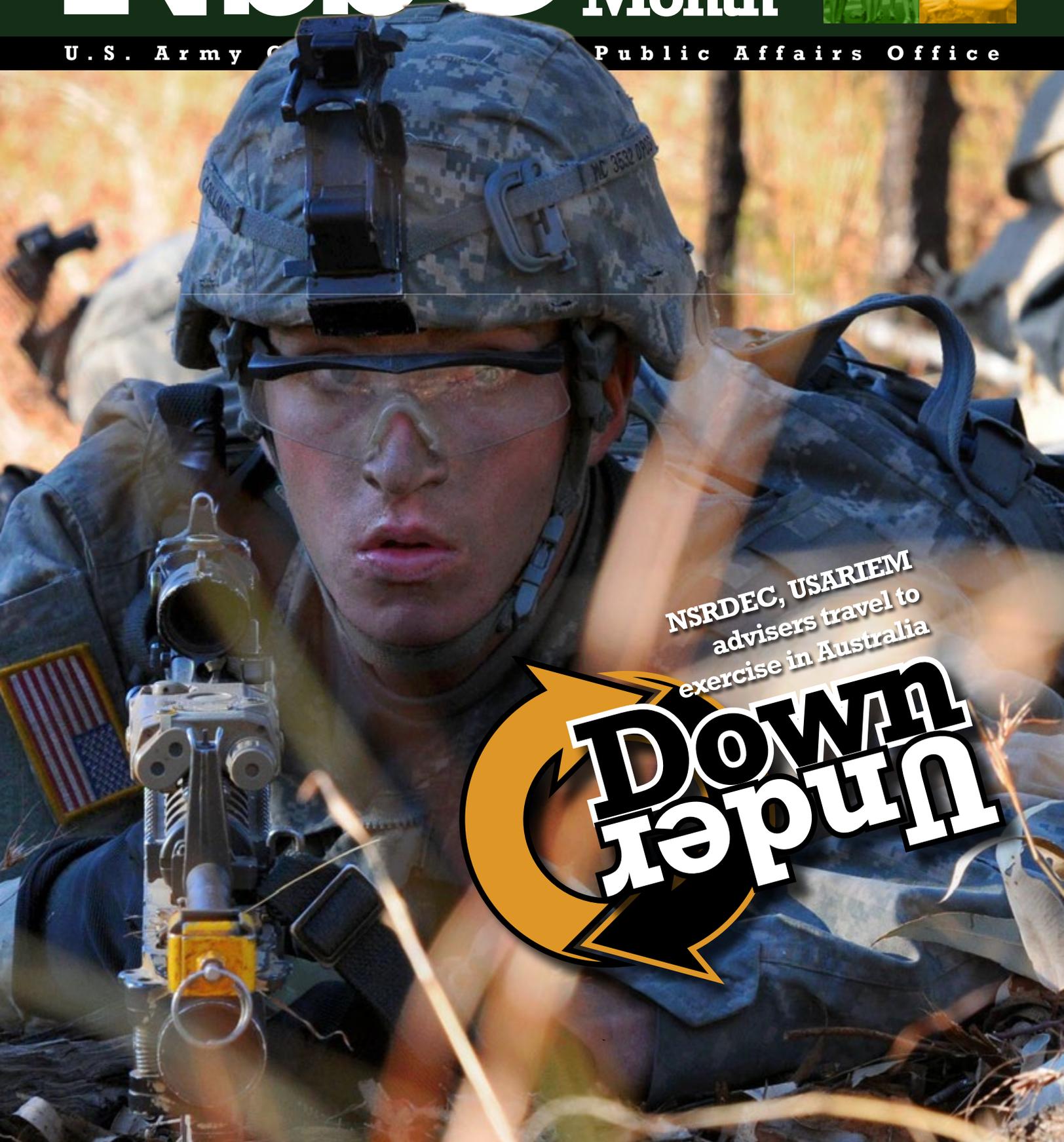


September 2015

NTSSC This Month

U.S. Army Center of Excellence for Soldier Systems Public Affairs Office



NSRDEC, USARIEM
advisers travel to
exercise in Australia

Down Under



Publisher's Note

John Harlow
USAG-Natick and NSSC Chief of Public Affairs



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Summer Thoughts ...



It has been a pretty amazing summer around here.

The dedication of General Greene Avenue was an amazing day. The support shown by the Town of Natick, Hanscom Federal Credit Union, and the Natick Veterans Relief Fund helped make the general's family feel welcome, and they truly appreciated the relationship he had with the people of Natick and the relationship we had with him.

Softball season has come and gone, with Sybarites winning the title. There was a great turnout all season, but there is always room for you. If you are interested in playing or watching, come by next season.

Army Community Service is celebrating 50 years of serving our Soldiers. At Natick, our ACS is holding an open house Sept. 15. There will be a cake-cutting ceremony and plenty of things for you to take with you. Find out more by stopping by ACS in Building 38.

September 28 will mark six years that I have been the Public Affairs Officer of the Natick Garrison. It has been a great ride so far. We have been able to tell some amazing stories and share what Natick does on behalf of the Soldier with Congressional members and staff, senior Army leadership and "Larry the Cable Guy." It has been, and will continue to be, a fun ride.

Our team is always looking to find new ways to share the Natick story. Whether it is the physical demands study, new field kitchen, or a new widget that attaches to the MOLLE gear, we look forward to sharing that story.

It is an honor to work at the Natick Soldier Systems Center. It is great to know that every day someone here has the ability to do something to help better protect Soldiers, give them more of the comforts of home, or find ways to help them physically as they defend us.

Thank you for reading NSSC This Month, and thank you for your service to our nation.

John Harlow
USAG-Natick and NSSC Chief of Public Affairs

NSSC This Month

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About this newsletter

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Summer Fun

Natick has GEMS down to a science

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (Aug. 11, 2015)

For the fifth summer in a row, the [U.S. Army Research Institute of Environmental Medicine](#) — with support from the [Natick Soldier Research, Development and Engineering Center](#) — is hosting its Gains in the Education of Mathematics and Science Program, or [GEMS](#). The program is held at the [Natick Soldier Systems Center](#).

The GEMS program originated at [Walter Reed](#) in 2005 and has since been adopted by many other Army research installations. Through GEMS, USARIEM provides middle and high school students the opportunity to participate in age-appropriate, hands-on experiences in science, technology, engineering, and mathematics, or [STEM](#). Advanced high school as well as college students serve as near-peer mentors who lead the programs and serve as role models for students.

This summer, USARIEM is hosting three GEMS sessions, giving students the chance to experience STEM in an interactive and meaningful way. Some of the experiences range from building a robot from toothbrushes to creating a chemical reaction resulting in molten iron.

“The GEMS staff and I are excited about science and are excited about engaging the minds of young scientists by applying complicated concepts in a particular way so that middle school students experience that ‘lightbulb’ moment,” said Spc. Sonya Edler, a medical laboratory technician at USARIEM and the program director for this year’s GEMS program.

Edler said she believes that the Natick Soldier Systems Center provides students with unique learning opportunities and is impressed with the dedication of both the students and staff.

“This summer we had 193 student interns (participants) and a total of 18 staff members who truly deserve the credit for the success of the program,” said Edler. “The resource teacher, near-peer and assistant mentors are an honor to work with. Also, Kelly Field, our Public Affairs officer, and Joanna Graham, our NSRDEC (point of contact), have played critical roles in helping this program run seamlessly. The new (lead) officer in charge is Maj. Joseph Kardouni, who has truly immersed himself into the program

and provides a huge military relevance to GEMS.”

“It is a unique program that combines building up leadership skills and teaching science with young adults, as well as a broad introduction to STEM — especially the application of science and engineering to students in a variety of exciting ways,” said Dan Eggers, the program/resource teacher for the GEMS program at USARIEM and a local high school teacher.

“The program gives kids a leg up when they return to their classroom, because they have already been exposed to complex topics,” said Lauren Francis, a student mentor for the program.

Jake Heinlein, along with Andrea McDonagh, is one of the head near-peer mentors. In his role, he designs and leads fun experiments with the students and helps other student mentors.

“What I find the most rewarding is seeing the students come back each year and seeing how they’ve grown and how their love for science has grown,” said Heinlein.

“The students and their parents always make the effort to thank our team for how awesome the program is and the fact that they leave here wanting more,” said Edler.

“I love GEMS,” said Sabrina, a student who was involved in the third GEMS session. “It’s such a fun experience. GEMS really makes learning exciting.”

Young Scholars

Natick shows career possibilities to students

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (July 31, 2015)

The possibility of a career in science, technology, engineering and math, or [STEM](#), became a little more real to a unique group of high school students visiting the [Natick Soldier Research, Development and Engineering Center](#) on July 30, 2015.

The students visited NSRDEC as part of their participation in the highly selective [Northeastern University’s Young Scholars Program](#). The program provides high school students interested in STEM the opportunity to garner hands-on experiences while still in high school.

“In addition to conducting research on campus, Young Scholars have the opportunity to visit several corporate and government research facilities,” said Claire Duggan, director for Programs and Operations, the Center for STEM Education at Northeastern University. “These experiences provide students a window into research currently being conducted and an opportunity to explore career opportunities for the future.”

The group of about 30 students interacted with NSRDEC scientists and engineers

and learned about the science and technology behind protective gear, advanced textile technologies, aerial delivery, shelters, and combat feeding — to name a few. Students also toured unique testing facilities, including the [Doriot Climatic Chambers](#).

“This is a great opportunity to provide these students a chance to see a developmental technology we’re evaluating for potential use by our military,” said Peter Lavigne, member of the Equipment & Energy Technology Team in NSRDEC’s [Combat Feeding Directorate](#).

“It was really interesting to apply what we’ve learned in school to real-world situations, especially the Army,” said Vindhya Kuchibhotla, a Sharon High School student and participant in Northeastern’s Young Scholar Program.

Senior Research Scientist — Soldier Nanomaterials, Dr. Ramanathan Nagarajan, is a top Army expert on nanomaterials-based technology. He believes that interaction between students and seasoned professionals is important for both groups.

“NEU Young Scholars visiting NSRDEC will see many examples of the work we do every day to make sure that Soldiers have protective clothing against various kinds of threats, food rations to sustain them during combat, shelters to protect them, and supplies delivered to them aerially in combat zones,” said Nagarajan. “The striking thing the students will notice is how science and technology make the difference in each case.”

“This experience was thrilling for me,” said Megi Maci, a Quincy High School student and participant in Northeastern’s Young Scholars Program. “I had the chance to walk in the shoes of an American Soldier. I was able to see how perilous a Soldier’s life is and the technology that enhances their safety.”

“Young students are intrinsically bright — even if they may not recognize it,” said Nagarajan. “They have no, or limited, preconceived opinions, but are capable of limitless imagination. When exposed to NSRDEC examples, they may come up with ideas of their own about how the Soldier’s life and work can be improved. Possibly, a number of them will end up in scientific fields and at least some may consider a scientific career at NSRDEC, or another Army lab, to become the next generation of innovators.”

National Suicide Prevention Month

September is National Suicide Prevention Month, and the American Foundation for Suicide Prevention reminds everyone to be aware of the potential warning signs in those around them.

According to the foundation’s website: “People who kill themselves exhibit one or more warning signs, either through what they say or what they do. The more warning signs, the greater the risk.”

According to AFSP, their talk, behavior and mood can be indicators of people at risk. For more information, visit <https://www.afsp.org/preventing-suicide/suicide-warning-signs>.

The cost
\$44 billion
Combined medical and work loss costs in the United States each year

An American dies by suicide every
12.95 minutes

Americans attempt suicide an estimated
ONE MILLION times annually

Veterans comprise
22.2% of suicides



Photo: Michael Stepien, DOD Combat Feeding Directorate



Food for Thought

Combat Rations Database receives update

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (Aug. 10, 2015)

The [Combat Rations Database](#) unveiled earlier this year is already receiving updates designed to make the website more useful to warfighters, military dietitians, food service officers and leaders.

The database — ComRaD, for short — debuted in March with accurate nutritional information about combat rations. It was the result of a collaborative effort between Department of Defense’s [Human Performance Resource Center](#), the Natick Soldier Research, Development and Engineering Center, or [NSRDEC](#), and the [U.S. Army Research Institute of Environmental Medicine](#) at Natick Soldier Systems Center.

The database contains information about the Meal, Ready-to-Eat; First Strike Ration; Meal, Cold Weather; and Food Packet, Long Range Patrol.

Later this month, a cart feature will be added to the site that will allow users to track what they have eaten by adding and removing ration components in order to view their overall daily nutritional intake. In September, information on group rations will follow.

ComRaD provides public access to accurate information at a time of increasing emphasis on performance nutrition in the military. Military dietitians want warfighters to better

understand how to fuel themselves before, during and after missions.

“It will be interesting to see how the individual warfighter actually uses it,” said Julie Smith, senior food technologist with the Department of Defense Combat Feeding Directorate at NSRDEC. “We haven’t received that feedback yet.”

Early analytics from the website (<http://hprc-online.org/comrad/>) showed that it was receiving heavy use, however. From Jan. 1 to April 30, ComRaD had 10,051 page views. Visitors had spent an average of 2 minutes, 28 seconds on the site.

“For now, I think we’ve delivered what the customer wants,” said Smith, “and I’m excited to be a part of the website development and launch.”

Smith pointed out that adding group rations to the database was a bit more complicated than it was with the individual rations.

“Because we do have to change some of the features,” Smith said. “The way that the (group ration) menus are planned are for added variety. In group rations, there’s a lot of split menus that enable an individual to choose one entrée or choose the other entrée.”

“It’s actually more difficult for warfighters to learn about group rations, because the nutrition facts label is not in front of them when they eat it. They don’t have easy access to nutrition information.”

As ration menus change in the future, items will be added or dropped from ComRaD.

“I think as people use it, I’ll be excited to get feedback,” Smith said. “I think that will really drive if additional work needs to be done.”

“But we know as time goes on, there might be new features that people would want.”

For more information about ComRaD, email usarmy.natick.nsrdec.mbx.nati-amsrd-nsc-ad-b@mail.mil.

[Natick Soldier Research, Development and Engineering Center](#) scientists are looking to vacuum microwave drying, or VMD, technology to create new, quality items for rations that may also reduce the warfighter’s carrying load.

NSRDEC researchers hope to acquire the pilot scale equipment to develop items that meet the stringent requirements of military rations that must be shelf stable for years in extreme climates with no access to refrigeration.

The rapid drying technology would enable the creation of lightweight, nutritious, inexpensive shelf-stable foods, including cheese, fruits, vegetables and meats. Such items could be incorporated into the following rations: Meal, Cold Weather; Food Packet, Long-Range Patrol; and Meal, Ready-to-Eat.

“Some of the conventional drying methods are not efficient,” said Dr. Tom Yang, a food technologist in NSRDEC’s [Combat Feeding Directorate](#), or CFD. “For example, sun drying takes a long time and is dependent upon Mother Nature. And it is not very sanitary. Another method is mechanical drying, which involves using a hot oven with hot air to remove moisture. But drying foods at a high temperature can affect quality, taste and texture. It is edible, but it can be hard like a rock. Drying foods can also take away nutrients. The food can shrink and the color can become dark. Not very appetizing.”

VMD combines vacuum and microwave technology, heating foods uniformly through a quick, gentle process.

“Since you combine vacuum technology with microwaving to remove water, you can do so at a lower temperature,” said Yang, who is part of CFD’s Food Engineering and Analysis Team. “You maintain nutrients since the rapid drying process doesn’t destroy heat-sensitive nutrients. The colors remain appetizing and the texture doesn’t become hard and brittle.”

In addition to producing higher-quality foods, the process takes less time than conventional air drying or freeze drying. Yang explained that freeze drying, which was pioneered at Natick years ago, is effective and retains good food quality but has some drawbacks.

“VMD takes freeze drying to the next level,” said Yang. “It is much less expensive and uses much less energy.”



Dry Run

New technology could aid ration development

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (Aug. 5, 2015)

Foods created by VMD are nutritious and pleasing to the palate. The technology also fits into NSRDEC’s mission to lighten the warfighter’s carrying load.

“It is low weight. It is very easy to eat on the move,” said Yang. “You don’t need to store it anywhere.”

The Food Engineering and Analysis Team, led by Lauren Oleksyk, hopes to obtain its own VMD machine for its Food Innovation Lab, where it will be used to create new foods for the warfighter and improve existing offerings.

“Our Soldiers deserve the best,” said Yang. “Soldiers do so many important missions. They are under a lot of stress. They need to be well fed. Their physical and mental state needs to be in top shape. We are hoping to get a [vacuum/microwave] unit so that we can use it as a tool to try out many ingredi-

ents and recipes that we know Soldiers would like to have.”

Yang said he thinks it is important to create some favorite foods for Soldiers far away from home.

“I have an idea for a shelf-stable cheeseburger with a layer of dried cheese, a layer of dried meat, and a layer of dried bread,” Yang said. “A regular cheeseburger would be highly perishable, but this one would be shelf stable for three years. This is one of the concepts I want to explore.”

“I like to explore new technology and new products. I like to see technologies that work, save money, and produce great rations that get into the hands of Soldiers.”



Running to Home Base Program helps veterans with TBI, PTS

By John Harlow/USAG-Natick Public Affairs (July 29, 2015)

More than 2,000 runners laced up their sneakers July 25 for a 9-kilometer run in Boston. The goal was to step on home plate at Fenway Park and help the Red Sox Foundation and Massachusetts General Hospital Home Base Program treat the silent wounds of war.

The sixth annual "Run to Home Base" saw nearly 2,300 runners raise \$1,000 each to help fund the research and treatment given to veterans and active-duty military through the program. Since its inception, more than 4,200 veterans and active-duty military have been treated for post-traumatic stress and traumatic brain injuries.

Boston Red Sox chairman Tom Werner had the vision of the Home Base Program following visits to Walter Reed Medical Center after the World Series championships in 2004 and 2007. The Red Sox Foundation pledged \$3 million to get the program started, and six years later it is a national model.

The Home Base Program is creating a two-week intensive treatment program that will be free for the veterans and service members.

"We currently use an outpatient model for treatment," said Home Base Program chief operating officer Michael Allard. "If you are a veteran or service member living outside of eastern New England, it's not a practical way to get treatment. This new program will allow veterans and service members to come from anywhere and be housed at the Navy Yard and receive two weeks of intensive treatment and therapy.

"This program will integrate fitness, nutrition, sleep and some alternative therapies. It will be a holistic, comprehensive program in a concentrated period of time. We want to make sure that the services we provide match the need of the veteran, service member or their families," Allard said.

Sgt. 1st Class Adam Morelli, first sergeant at the U.S. Army Research Institute of Environ-

mental Medicine, is a patient receiving treatment at the Home Base Program. He served in Iraq from December 2007 to December 2008 as a combat medic with 1-6-2 Iraqi Army Military Transition Team.

In April 2008, Morelli was relieving the gunner of a mine-resistant, ambush-protected, or MRAP, vehicle and moving to a different location when an improvised explosive device detonated on its right side. He treated the victims of the explosion and continued on duty. It wasn't until September that his leadership started to see signs of traumatic brain injury in Morelli.

Three different treatment facilities were unable to get him back on track. Memory loss continued, headaches increased and symptoms of vertigo began.

Morelli started receiving treatment in 2013 through the Home Base Program.

"They get you in with the right doctors and right therapists to treat each symptom as its own entity," said Morelli. "They're willing to work with you on your schedule, but also they are focused on getting the Soldier or veteran the right treatment.

Morelli has seen many gains as a result of his work with the doctors and therapists at Home Base.

"My balance has improved, and it is a work in progress," said Morelli. "I am learning how my body reacts to certain things, and it helps me cope and find other solutions (for) what I can't fix.

"I have found ways to work through my short-term memory loss. Instead of a phone call to set an appointment, I send out calendar invites. I have learned triggers that cause me to lose balance and ways to recognize them and work around them to stay productive."

Morelli believes that this program has benefited his recovery and should be spread across the nation.

"There should be some version of the Home Base Program near every major military installation in the country," said Morelli. "There are thousands of Soldiers who were like me, suffering in silence. Programs like this will definitely help them in their recovery.

"After seeing the progress I was making, the leader who recognized the TBI symptoms I was showing is now getting treatment himself. That makes me feel like this journey is worthwhile, because someone else got help."

Denise Florio was deployed to Iraq as a combat medic from December 2002 until August 2004 with the 94th Military Police, New Hampshire Army Reserve. She returned from deployment a different person.

"While serving in Iraq as a medic, I dealt with medical cases I was not prepared for," said Florio. "I was also injured in a tank accident. But the biggest problem I dealt with was a senior sergeant who was physically, mentally, verbally and sexually abusing me during the majority of my deployment."

She suffered in silence for years.

"I was in some very dark and lonely places. I attempted suicide shortly after returning home," she added. "I now know that there are different treatments and that I am supported by an amazing staff of therapists and I receive support from fellow veterans."

Because of the Home Base Program, she is alive today and expecting a baby boy on Sept. 16.

"They sent me to a two-week female (post-traumatic stress) program, which jump-started my treatment," said Florio. "I gained my confidence back but also an understanding as to why I am who I am now. I gained tools I use daily.

"They mean what they say, and they follow through. They will not let the darkness take you."

In the six years of the Run to Home Base, more than \$12 million has been raised to promote research and treatment for PTSD and TBI. The treatment isn't restricted to just the veterans or service members. Family members are also welcomed by the program. More than 3,200 family members have participated in the Home Base program since its inception.

To learn more about the Home Base Program, go to www.homebaseprogram.org.

Scientists at the U.S. Army Natick Soldier Research, Development and Engineering Center, or NSRDEC, are investigating high-barrier, non-foil materials, which have the potential to be lighter in weight, less expensive, and more environmentally friendly than foil-based packaging.

The non-foil materials – which are based on nanotechnology – could be used for military ration packaging and for food packaging that supports deep space missions for NASA. The Advanced Materials Engineering Team, or AMET, part of NSRDEC's Combat Feeding Directorate, or CFD, is working on the nanocomposite materials, which are an ideal packaging choice for shelf-stable processed foods.

Nanocomposite films can improve the barrier, mechanical and thermal properties of non-foil food packaging films.

"The incorporation of nanotechnology into barrier films has proven to be a critical ingredient in our packaging design that will allow us to achieve food protection properties only seen before through the use of foil-based systems," said Dr. Christopher Thellen, a materials engineer in NSRDEC's CFD.

Nanocomposite packaging can be lighter in weight and less expensive than foil pouches and can potentially reduce the amount of solid waste, enhance the quality of the rations and reduce the warfighter's logistical burden.

The technology is based on the incorporation of nano-clay particles into thermoplastic resins. These materials are 1,000 times smaller than conventional composite material fillers.

Nanocomposite packaging can be lighter in weight and less expensive than foil pouches and can potentially reduce the amount of solid waste, enhance the quality of the rations and reduce the warfighter's logistical burden.

Nobody's Foil

Natick investigates materials for food packaging

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (July 28, 2015)

The high-barrier, non-foil material will decrease the permeation of oxygen and water molecules through packaging materials, thus better preserving food freshness and better ensuring safety. The packaging will comply with the meal, ready to eat, or MRE, requirement of maintaining a three-year shelf life. The packaging will maintain up to a five-year shelf life for space applications.

Food sterilization techniques, in combination with proper packaging, play an important role in providing this extended shelf-life protection. Retorting is the food industry's most common commercial sterilization process for pre-packaged, low-acid foods.

This process exposes food packages to high moisture and high temperature conditions. In some cases, the long retort process causes severe thermal impact to the food and the package, leading to a reduction in food quality and limiting the types of packaging materials that can be used.

Dr. Jo Ann Ratto, team leader, AMET, NSRDEC CFD, said that the implementation of a non-foil structure into food packaging will provide the ability to consider novel sterilization methods, such as microwave-assisted

thermal sterilization, or MATS, and pressure-assisted thermal sterilization, or PATS.

MATS and PATS are desirable alternatives to retort sterilization as these methods reduce the time needed to raise the product temperature to that required for the thermal lethality of target bacteria. A shorter process time can improve food quality and nutrient retention, which is one reason these methods are so attractive for both the U.S. military and NASA.

AMET is exploring polymeric packaging for these novel methods in collaboration with CFD's Food Processing Engineering & Technology Team. The two teams are also studying the effect of the various processing methods on vitamin stability, in an effort to not only preserve freshness and food safety, but also prevent nutrient loss.

"The nanocomposite research and development work has been challenging and rewarding for the Advanced Materials Engineering Team. After further demonstration and validation work, we will know if these materials have acceptable performance to be considered for incorporation into ration packaging for the warfighter," Ratto said.





Gift for Doriot

Massachusetts gives \$900K for chambers upgrade

By Jeffrey Sisto, NSRDEC Public Affairs / NATICK, Mass. (Aug. 3, 2015)

The Secretary of the Army has accepted a \$900,000 gift from the Commonwealth of Massachusetts' Development Finance Agency, or [MassDevelopment](#), to perform infrastructure upgrades to the [Doriot Climatic Chambers](#) at the U.S. Army's [Natick Soldier Systems Center](#).

"On behalf of the United States Army, I am pleased to formally accept the gift of funds to enhance existing facilities within the Doriot Climatic Chambers at U.S. Army Natick Soldier Systems Center," said the Honorable [John McHugh](#) in an official acceptance letter to MassDevelopment in March. "Please accept my deepest appreciation for this generous and thoughtful gift."

Now, the commonwealth is demonstrating a renewed commitment to its only remaining active-duty Army installation by funding renovations to one of NSSC's signature research facilities.

"I am proud of the collaboration among industry, academia, and the Department of Defense that will be enabled by these upgrades," said Massachusetts Governor [Charlie Baker](#). "The great work done at Natick's first-class facilities is a vital component to the research needed to fully serve the needs of a modern military and our national security interests."

The chambers is a unique testing facility capable of producing extreme environmental conditions for the Army's equipment and human-performance-related research and technology development. The facility consists of two large, main chambers that simulate tropical and arctic environments by replicating the temperature, humidity, wind, rainfall and solar radiation conditions found anywhere in the world.

"The expansion of systems capabilities in two of the smaller temperature conditioning rooms will give Army personnel a more energy-efficient, cost-effective and adaptive capability to conduct research," said McHugh.

While the chambers primarily support military research, their specialized capabilities can also benefit nearby academic institutions and commercial industry.

MassDevelopment — whose mission includes stimulating economic and industrial growth, increasing employment, promoting prosperity and building communities throughout the commonwealth — is supporting the opportunity to foster cross-sector, collaborative research partnerships that will advance science and technology innovation.

"Upgrading this Natick Soldier Systems Center facility is critical to promoting federal, industry, and academic collaboration in the Center's work," said MassDevelopment President and Chief Executive Officer [Marty Jones](#). "The Commonwealth's military installations play a major role in the Massachusetts economy, and MassDevelopment is pleased to support Natick Soldier Systems and encourage further innovation."

Potential partners include any organization within the Department of Defense, industry, or academia that conducts research and development-based testing on clothing, tent shelters, sporting equipment, cold-weather gear, eyewear, food, food equipment, personal electronics, or humans in extreme climates. Under appropriate arrangements, the chambers can be used by non-federal entities interested in conducting similar research and development.

The chambers are operated by technicians from the Natick Soldier Research Development and Engineering Center. The chambers serve as a joint-use facility with the [U.S. Army Research Institute of Environmental Medicine](#), also a NSSC tenant organization, responsible for the Army's medical research and development aimed at optimizing servicemen and women's health and performance during training and on the battlefield. The NSRDEC-USARIEM partnership ensures a comprehensive approach to human performance-related

research and development efforts conducted in the chambers.

The two smaller conditioning rooms receiving the system upgrades were originally designed to be used when specific testing does not require use of the larger chambers or wind tunnel. However, the mechanical systems were never implemented, causing considerable energy usage. In a single year, the NSSC often spends more than \$125,000 just to power the chambers.

The gift from MassDevelopment will fund the installation of new mechanical and electrical systems, reducing the chambers' annual operating costs by more than \$71,000 and energy use by 85 percent.

The simpler mechanical controls and smaller room sizes will allow for minimal operator oversight, significantly reduce energy costs, and consume smaller amounts of non-HCFC refrigerant, resulting in a smaller carbon footprint. The implementation of modern, automated systems will also enable researchers more frequent, longer-running tests, creating a faster response to emerging test requirements without risk to the equipment and personnel.

The design phase of the upgrades will take an estimated three months, while the construction and startup phases are projected to take approximately six months.

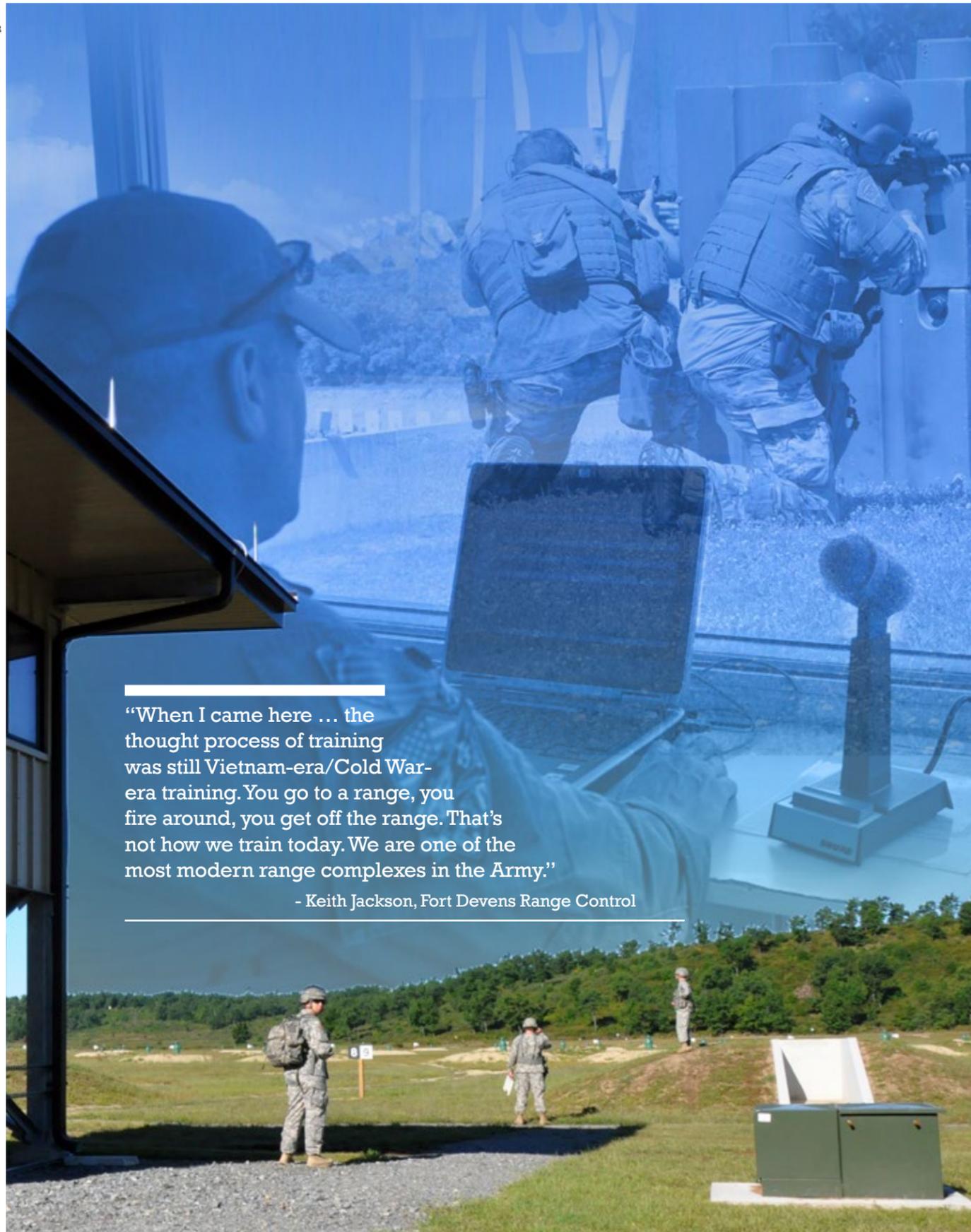
"I am grateful for the Commonwealth's enduring support of our Soldier-focused mission," said [Brig. Gen. William Cole](#), NSSC senior commander. "MassDevelopment's generous gift to upgrade the chambers will enhance our existing capability, as well as generate new collaboration opportunities with leading university and industry researchers who may also use the facility through Test Services Agreements.

"Most importantly, the increased capability will allow NSSC to more quickly and efficiently develop state-of-the-art equipment for our Soldiers."





Photos: Bob Reinert, USAG Natick Public Affairs



“When I came here ... the thought process of training was still Vietnam-era/Cold War-era training. You go to a range, you fire around, you get off the range. That’s not how we train today. We are one of the most modern range complexes in the Army.”

- Keith Jackson, Fort Devens Range Control

Home on the Range

Fort Devens complex continues to grow

By Bob Reinert, USAG Natick Public Affairs / FORT DEVENS, Mass. (Aug. 14, 2015)

On his first day of work as the Range Control chief at [Fort Devens](#) a decade ago, Keith Jackson climbed up a ladder and into one of the old wooden range towers sprinkled across the South Post complex.

The Soldier inside asked him if the tower was safe. Jackson shifted his feet to quickly check.

“The whole thing starts swaying, and I’m listening to the wood crack,” Jackson recalled. “I condemned them all. I condemned every tower on South Post. That’s how I introduced myself.”

Over the years at Devens, Jackson never stopped listening to Soldiers. He recalled standing in a light mist one day and asking a Soldier how to improve the range that he had just shot at.

“He said, ‘You’re kidding, right?’ I said, ‘No, I’m serious,’” Jackson said. “He says, ‘You don’t get it, do you?’”

The Soldier pointed out that they were talking in the rain because the bleachers were uncovered.

“I just went on this big spree (of covering bleachers) because a private told me,” Jackson said. “I like listening to privates.”

Ten years later, much has changed at the Fort Devens Range Complex. Jackson kept making improvements long after all the towers were replaced and the bleachers were covered.

“When I came here ... the thought process of training was still Vietnam-era/Cold War-era training,” Jackson said. “You go to a range, you fire around, you get off the range. That’s not how we train today. We are one of the most modern range complexes in the Army.”

Jackson, an Operation Iraqi Freedom veteran who retired from the Army as a sergeant first class in 2005, has spent the past decade overseeing the explosive growth of the nearly 5,000-acre Range Complex on South Post. Over that time, the [Army Reserve](#) has poured more than \$50 million into improvements there, with even more to come.

Fort Devens serves as a training resource for thousands of Army Reserve and [National Guard](#) Soldiers from throughout the six New England states and beyond. The [Marines](#), [Federal Bureau of Investigation](#) agents, and state and local police also use the state-of-the-art complex’s 25 ranges, 28 tactical training areas and 29 facilities.

“We train all the branches,” Jackson said. “Fort Devens is the only federal training base in all of New England. That puts a lot of responsibilities on us.”

The Fort Devens range staff, which emphasizes safety and environmental stewardship, has a combined 100 years of military experience between its members.

“Now that is critical in this job,” Jackson said. “You have to look for specialties. We have the knowledge, still. These guys, they get it. Their No. 1 focus is on training the military. That’s it.”

That staff runs a host of ranges that have been upgraded to electric systems from pneumatic systems that used to freeze for months during harsh New England winters.

“The targets wouldn’t actuate at that point,” Jackson said. “We’ve replaced them all. Now they’re fully electric. They’re awesome ranges.”

The Fort Devens ranges can accommodate pistols, rifles, machine guns, hand grenades,

grenade launchers and mortars. The complex’s tactical training areas can be used for land navigation, orienteering, field training exercises, and air drop. One of its more impressive facilities is an automated live-fire shoot house.

“You won’t see this shoot house anywhere else,” Jackson said. “There’s video cameras in there; everything is recorded. When you finish your training at the end of the day, I will give you a copy of that CD of all the recording that we did so you can go back to home station, put it into your computer and say, ‘This is what we did right. This is what we did wrong.’ It’s a great training tool.”

Also found on the complex is what Fort Devens calls the Tactical Training Base. Run by [Product Manager Force Sustainment Systems](#) at [Natick Soldier Systems Center](#) — which refers to it as the [Base Camp Integration Laboratory](#) — the base features two 150-man Force Provider camps. One is set up with current technology; the other bristles with new systems being tested. Over the past five years, tens of thousands of warfighters have stayed on the base while training at Fort Devens.

All the improvements to the Fort Devens Range Complex over the years have paid off in impressive usage numbers. Over the past three years, throughput at the complex stands at 335,931. Jackson expects fiscal year 2015 to finish strong.

“I honestly believe we’re going to break ... 130,000,” said Jackson of the FY 2015 throughput. “That tells you that we are training.”

And training warfighters — and listening to privates — are what Jackson and his team are all about.



Photo: Spc. Joshua Edwards

Power Up

Making base camps more energy efficient

By Jeffrey Sisto, NSRDEC Public Affairs and Allison Barrow, CERDEC Public Affairs / ABERDEEN PROVING GROUND, Md. (Aug. 17, 2015)

When you need to charge a cell phone or turn on the lights, the power is typically there. You most likely don't have to wonder how you'll get it or how long you'll have it.

But for Soldiers at small base camps in forward operational environments, being able to harness and maintain power is essential for operating effectively. The better they're able to manage available power and energy, the less they have to rely on resupply convoys to bring more fuel and batteries — driving up costs, taking Soldiers away from other missions, and risking lives in the process.

The Secretary of the Army, the Army Chief of Staff, and the Sergeant Major of the Army made effective energy solutions a top priority, and the Army has a number of initiatives to make base camps more energy efficient by

enabling Soldiers to not only maintain power for longer, but to intelligently control power distribution. The aim is to decrease the power draw and more smartly manage the use of available power, limiting the number of resupply convoys needed.

The Army demonstrated a number of these integrated capabilities at the [Base Camp Integration Lab at Fort Devens](#), Massachusetts, July 7-31, with the overall goal of reducing fuel, water and waste at small base camps.

This 300-person camp demonstration was the third in a series of demonstrations

that are part of the Sustainability Logistics Basing — Science Technology Objective Demonstration, known as SLB-STO-D. The research effort to make base logistics more sustainable is led by the Research, Development and Engineering Command, and is being managed by the Natick Soldier Research, Development and Engineering Center, or [NSRDEC](#), with collaboration from the Communications-Electronics Research, Development and Engineering Center, or [CERDEC](#), for several fuel-saving technologies; the Tank Automotive Research, Development and Engineering Center to reduce water demand and waste water generated; and the Army Research Laboratory for basic research across each of the areas.

“These operational demonstrations provide an excellent opportunity to showcase how each of the fuel, water and waste technologies contributes to the overall objectives when integrated together. The data collected during the event allows the systems with the

highest return on investment and those that have the biggest impact to be identified,” said Gregg Gildea, NSRDEC’s lead for the SLB-STO-D.

CERDEC’s Command, Power and Integration Directorate, or CP&I, is leading several fuel-reduction technologies with the task to cut fuel consumption by 25 percent.

“Our job is to demonstrate our technologies and show how their improvements impact the issues — those being reduction of fuel consumption, operational efficiency and how it impacts mission flexibility,” said Selma Matthews, CERDEC CP&I engineer, and fuel lead for the project.

One of CERDEC’s initiatives for intelligent power management is the Energy Informed Operations project, which is developing a nonproprietary tactical microgrid architecture that allows integration and sharing of different power sources aimed at providing more efficient, more reliable power for a tactical base camp.

In this demonstration, the team constructed a large microgrid consisting of several generators that powered base camp equipment, including shelters and shower facilities, as well as air conditioners, called environmental control units, said Garrett Clarke, the CERDEC CP&I software lead for Energy Informed Operations.

Having the ECUs connected to the microgrid allowed for better power distribution and provided the microgrid with initial steps toward identifying what loads are connected to the grid, and allowed the grid to intelligently shed those loads to save power if necessary, Clarke said.

Soldiers could control the ECUs directly through the EIO software application. For example, Soldiers were able to turn off the cooling inside a specific tent to save power.

“The objective of the Energy Informed Operations architecture and standards will allow Soldiers to efficiently manage, monitor and control a microgrid,” said Clarke. “This will provide Soldiers with real-time information about their power resources in situations where they may be constrained, may not be able to get resupply or have multiple generators or other power resources available to them. The microgrid will take into account these things and provide them with the best way to sustain their power as long as possible until that resupply can occur,” Clarke said.

ECUs with improved efficiency was another

capability CERDEC brought to the demonstration as part of its Innovative Cooling Equipment, or ICE, program. The ICE program aims to reduce the electrical energy required to produce cooling and heating for forward bases as well as brigade and below environmental requirements. This is done through advancements in thermodynamic cycles, electronics/digital controls, heating ventilation, air conditioning components, and waste heat recovery.

The Army Materiel Systems Analysis Activity and Project Manager Expeditionary Energy and Sustainment Systems have found that up to 60 percent of generator power goes to environmental control, said Bill Campbell, CERDEC CP&I ICE project manager.

The advanced ECUs benefit Soldiers through improved and sustained control of the environment, reduced noise, and humidity control, Campbell said.

“A 10-percent ECU efficiency improvement would translate to a savings of more than three million gallons of fuel. This represents

not only a potentially significant cost savings, but a major reduction in the number of fuel convoys required to sustain the operations,” Campbell said.

“The ICE program has built prototypes which have shown that the 10-percent efficiency reduction is achievable. We are looking to continue our efforts with an ultimate goal of as much as a 30-percent efficiency improvement in all ECUs.”

NSRDEC’s Energy Efficient, or E2, Optimization program also reduces fuel consumption in combat outposts and platoon base shelters through enhanced energy-control management, battery storage, improved electrical component design and energy-efficient shelters.

E2 Optimization’s improved shelter systems feature thermal insulation, solar shade, passive ventilation and LED lighting, while two ECUs improve the heating, cooling and dehumidification capabilities. A Microgrid Storage and Distribution Unit battery stor-

age distribution system coupled with power monitoring software minimize the running time and logistical burden of generators.

Additional power technologies demonstrated were Man-Portable Generator Sets for Power Generation for Expeditionary Small Unit Operations, or MANGEN, and the Onsite Automatic Chiller for Individual Sustainment, or OACIS. MANGEN addresses the Army’s power gap between large batteries and small generator sets. The program provides a lightweight, man-portable conversion kit that adapts gasoline engines to be able to run on JP-8 fuel, the main fuel found in the field.

“The OACIS leverages high-efficiency refrigeration technology to reduce the energy and power needed to chill up to 500 liters of bottled beverages at base camps. OACIS reduces the fuel draw and encourages Soldier hydration via easy access to cold beverages,” said Gildea.

Soldier perspective is an important part of becoming a more energy-efficient force, and Soldiers from the 542nd Quartermaster

The Army demonstrated a number of these integrated capabilities at the Base Camp Integration Lab at Fort Devens, Massachusetts, July 7-31, with the overall goal of reducing fuel, water and waste at small base camps.

Forcer Provider Company were on hand throughout the demonstration to provide feedback on the applicability of the technologies and to test their ease of use, Matthews said.

“The EIO microgrid went above and beyond what we expected to see,”

said a Soldier with the 542nd Force Provider Company during the demonstration. “Everything that it could possibly do would make our job even easier.”

Planning is underway to demonstrate approximately 25 additional technologies to help make base camps more efficient during fiscal year 2016 at two venues: a 1,000-person camp demonstration at the [Contingency Base Integrated Technology Evaluation Center](#) at Fort Leonard Wood, Missouri, and a 300-person camp demonstration at the BCIL.

Additionally, a capstone integrated demonstration is being planned with acquisition partners to showcase technologies with the greatest impact to base camp efficiency and potential for transition to programs of record in fiscal year 2017.



Driving Innovation

Army science, technology lead the way

By Maj. Gen. John F. Wharton, U.S. Army / ABERDEEN PROVING GROUND, Md. (July 27, 2015)

Scientists and engineers from across government, industry and academia are searching for technology solutions to bring empower American warfighters. Innovation is the fuel for the Army of the future.

Army leaders have described how future Soldiers will “prevent conflict, shape security environments, and win wars while operating as part of our Joint Force and working with multiple partners” in the recently released Army Operating Concept, or [AOC](#).

The AOC is our foundation, and it’s driving our science and technology strategy.

“The AOC is a beginning point for the innovation we need to ensure that our Soldiers, leaders and teams are prepared to win in a complex world,” Army Chief of Staff Gen. Raymond T. Odierno wrote when he introduced the concept.

Innovation is critical for both the operational and institutional Army, he said.

The AOC points out that innovation is the result of “critical and creative thinking and the conversion of new ideas into valued outcomes.”

As the Army’s principle innovators we have worked hard to balance the goals of this mandate by developing strategic partnerships that trigger innovation and aligning the command to be able to capture the spark of new ideas and convert it into the organizational energy that drives the attainment of valued outcomes.

We continually reach out to our industry partners as we seek to maintain the Army’s decisive overmatch because we recognize the

[Department of Defense](#) is not the sole source of key breakthrough technologies. Many groundbreaking technological innovations in robotics, advanced computing, miniaturization and 3-D printing come from the commercial sector. Collaboration with these innovators will breed new ideas and ensure our technological edge through the next several decades.

“The Army needs innovative methods to develop technologies that will optimize the capabilities of smaller units by increasing battlefield intuition, military judgment and decision making.”

Maj. Gen. John F. Wharton

Our goal is to capture the benefit of those partnerships and fuse it with our own innovations. To tackle the Army’s most important objectives, we have aligned ourselves across the [U.S. Army Training and Doctrine Command’s](#) Centers of Excellence. The [U.S. Army Research, Development and Engineering Command](#) technical staff now works in the same seven portfolio areas defined by the [Assistant Secretary of the Army \(Acquisition, Logistics and Technology\)](#). All this is done under the Army Operating Concept philosophy to ensure our efforts address the Army’s warfighting challenges.

Accomplishing this means investing in our most innovative capabilities, such as our

prototype integration facilities. Innovative research and development leads to advanced prototyping, which enables smart design, which leads to lowering sustainment costs. Increased funding in coming years will enable our engineering teams to turn ideas into prototypes and then innovate capabilities informed by that prototyping. It also opens up the opportunity to re-engineer existing technologies to use them in different ways or different contexts to deliver new capabilities to Soldiers.

We recognize there are no “silver bullet” technological solutions. It’s not about the technology or device but about enabling the Soldier. Our efforts incorporate innovative solutions to fill technology gaps and make our Soldiers safer, stronger and more situationally aware of their environments.

Innovation will ensure the United States maintains its technological edge. It counters challenges to our competitive advantages and focuses our investments while creating options for future leaders. The Army needs innovative methods to develop technologies that will optimize the capabilities of smaller units by increasing battlefield intuition, military judgment and decision making.

Across RDECOM, I applaud the research and development innovations that lead to technological advancements. Whether it is new sensors, better batteries, or stronger materials for armor protection, the goal is the same. We innovate because it’s all about supporting our Soldiers with the best possible technologies to help them accomplish their missions.



Maj. Gen. John F. Wharton commands the U.S. Army Research, Development and Engineering Command at Aberdeen Proving Ground, Maryland.

Photo: Conrad Johnson



NSRDEC, USARIEM
advisers travel to
exercise in Australia

DOWN UNDER



Photo: Sgt. Sinthia Rosario

As

nearly 30,000 U.S. and Australian Service members convened for [Talisman Sabre 15](#), Army officials said the two-week exercise was a prime opportunity to address technological concerns.

U.S. Army science and technology advisors traveled across Australia July 7-20 to discuss issues with operational units during the joint, biennial exercise.

“Soldiers are happy to talk with you about their equipment,” said Lt. Col. Tom Bentzel, director of the U.S. Army International Technology Center Australia. “We got good feedback about boots, packs, vehicles, logistics supply chain, and command and control issues with communications connectivity and interoperability.”

“Hopefully we’ll be able to turn those into ideas that become research projects or contribute to ongoing projects and bring more relevance to them.”

The ITC in Australia is part of the [U.S. Army Research, Development and Engineering Command](#). The ITC mission is to work cooperatively between countries on research and development projects that bridge gaps and achieve common goals.

Bentzel, along with Capt. Scott Pegan of U.S. Army Reserve Sustainment Command

Detachment 8, were based at Camp Rocky, Queensland, during the exercise. They traveled to several exercise locations to meet with American and Australian operational units.

They submitted 35 requests for information to RDECOM headquarters on behalf of Soldiers. The RFIs are forwarded to the appropriate U.S. Army research and development center, and six requests were answered during the exercise. Four RDECOM centers received RFIs.

“Commanders in the field welcomed our presence,” Bentzel said. “They recognize they won’t see resolutions in six months, but it’s achieving that RDECOM objective of being relevant to Soldiers in operational units and serving their needs.”

“Sometimes it takes a bit of imagination to see beyond the daily common everyday problems that Soldiers have and see how science can influence those. Look beyond acquisition to look to the science. We were looking for ways that we could improve their comfort, effectiveness and efficiency in the field.”

Mission command interoperability and communications connectivity was the greatest issue for Soldiers, Bentzel said. Some American systems did not interact well with Australian ones or were not able to be configured properly because of the complexity of the networks.

“RDECOM is supporting each of the Pacific Pathways exercises as part of its commitment to being warfighter focused,” Bentzel said.

In addition to RDECOM’s team on the ground in Australia, the command also provided technical expertise to U.S. Army paratroopers flying from [Joint Base Elmendorf-Richardson](#), Alaska.

About 400 Soldiers parachuted onto Kapyong Drop Zone at Williamson Airfield in Australia. The 4th Infantry Brigade Combat Team (Airborne), 25th Infantry Division, jumped from seven C-17 Globemasters, two of which belonged to the Royal Australian Air Force. The 19-hour journey was their longest infiltration direct flight.

Andy Margules, RDECOM’s Field Assistance in Science and Technology advisor assigned to U.S. Army Alaska, said three Army organizations worked together on the Soldier readiness issues of proper nutrition, heat-related injuries, dehydration and sleep cycles.

“With 4/25 being active and able to engage in its objectives immediately after landing, it gives confidence to the Australian forces that the U.S. is ready and prepared to execute

such a mission in the future,” Margules said.

Scientists from RDECOM’s [Natick Soldier Research, Development and Engineering Center](#) gave advice on nutrition. They provided more than 800 First Strike rations and explained the nutritional benefits compared with commercial alternatives. In addition, they explained how Soldiers could change their eating habits before the exercise to prevent lethargy after landing in Australia.

The [U.S. Army Research Institute of Environmental Medicine](#) discussed how to prevent heat-related injuries upon landing based on thermal loading predictions and equipment requirements. US-ARIEM also provided information on the amount of water needed prevent dehydration during flight and once on the ground.

Finally, [Walter Reed National Military Medical Center](#) sleep specialists presented the optimal sleep plan for the flight. The plan detailed when Soldiers should be sleeping (with and without the use of sleep aids), the difference in sleep cycling for Soldiers landing to refuel in Hawaii versus those flying non-stop, and how Soldiers should change their sleep cycles to match Australian time.

Scientists from RDECOM’s Natick Soldier Research, Development and Engineering Center gave advice on nutrition. The U.S. Army Research Institute of Environmental Medicine discussed how to prevent heat-related injuries upon landing based on thermal loading predictions and equipment requirements.

“The gaps addressed by RDECOM were not technological in nature but show that the research and engineering at RDECOM can address non-technological or ‘soft gaps’ when challenged,” Margules said.

“While the soft gaps raised by 4/25 for this exercise are unique to their role as the Airborne response force in the Pacific area, they can be applied to any other long duration mission by U.S. forces.”



Photo: 1st Lt. Timothy Golden



Photo: Sgt. Sinthia Rosario



Photo: Sgt. Sinthia Rosario



Best Foot Forward

Ruck marching from Boston to New York to prevent veteran suicides

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (Aug. 27, 2015)

Two Soldiers and an Army Reservist who work at the [U.S. Army Research Institute of Environmental Medicine](#) at Natick Soldier Systems Center will ruck march Sept. 8-11 from Boston to New York to raise money for a charity seeking to reduce veteran suicides.

Kristen Heavens, a Reserve first lieutenant who came up with the idea, Staff Sgt. Shaun Morand and Spc. Sonya Edler will be part of a team from Active Heroes' [Carry the Fallen – Team Minuteman](#) who will share the 220-mile march from the Massachusetts State House in Boston to New York's Freedom Tower with approximately 50 pounds on their backs.

The team will arrive in New York on the 14th anniversary of 9/11 to raise awareness of veteran suicides and to remember all those who lost their lives on and since that fateful day in the fight against terrorism. They will then participate in the Carry the Fallen – 9/11 Memorial Ruck on Sept. 12 in New York.

They will raise funds to support Active Heroes, which is building a military family retreat center in Shepherdsville, Ky., in hopes of reducing the 22 suicides occurring daily among veterans. That's more than 8,000 each year, or in excess of 100,000 since 9/11. The Boston-New York ruck march will symbolically cover 10 miles for each of the 22 daily suicides.

By doing the ruck march, Heavens, Morand and Edler will honor [Justin Fitch](#), the retired Army major who finished his career at Natick and has terminal colon cancer. Fitch, the former Team Minuteman leader, has devoted his remaining days to ending veteran suicides. As they ruck march, the team will carry Fitch's gear.

"He wakes up to pain every, single day — physical, mental, everything," said Heavens of Fitch. "Yet, he still chooses to drive on and still chooses to be positive."

Fitch, now living in Wisconsin, is obviously touched by what his former teammates are doing in his name.

"I am humbled and honored by this meaningful effort from such great members of my team," Fitch said. "While it has my name attached, it is not about me; it is about the 22-plus veterans committing suicide daily.



"One of the biggest things I always say is, everybody has their baggage — it's all how you carry it. And this is to kind of symbolize that we'll carry it with you. We want to help you, and we're here for you. We'll carry it for you."

1st Lt. Kristen Heavens

"These are all good things — exercise, discussion, camaraderie, fundraising and awareness. I just wish I could be out there physically with them, but it is beyond (my) limits."

The three Soldiers from Natick, who are using leave and vacation time to do this ruck march, will be pushing their own limits. While all of them have done charity rucks in the past — including Heavens' grueling 54.4-mile effort back and forth on the [Boston Marathon](#) course — none has tackled anything close to this epic trek through Massachusetts, Rhode Island, Heavens' and Morand's home state of Connecticut, and New York.

"The distance that we're traveling is much further than we'll have traveled in the past," Morand said. "You'll ruck for six hours, then

you'll be logistics support for six hours, and then you'll sleep for six hours, ideally."

Two or three ruckers will march at a time. They will be followed by support crew in a pair of vans, one of which will have seats removed to accommodate sleep.

"All of the logistics are going to be challenges," Heavens said. "The physicality of this is going to be a challenge. Obviously, your body's not used to all of this."

The day after they arrive in New York, they will add a symbolic 9.11 miles in the 9/11 event.

"Getting started that morning is going to be tough," Morand said. "Getting your feet going that morning is going to be tough."

"We'll make it through that," Heavens said. "Nine miles after you've done 220 shouldn't be tremendous. I mean, we can kind of push through that."

If motivation wanes along the way, the three need only remember the cause they are supporting.

"I think just the fact that we've got 22 veterans a day committing suicide is just appalling in this country," Morand said. "So, something needs to be done, and to raise that awareness is, I think, such a high priority."

Heavens agreed that it's all about focusing attention on veteran suicides.

"One of the biggest things I always say is, everybody has their baggage — it's all how you carry it," Heavens said. "And this is to kind of symbolize that we'll carry it with you. We want to help you, and we're here for you. We'll carry it for you."

For additional information about the Boston to New York City ruck march, visit <https://fundraise.activeheroes.org/fundraise?fcid=484177>.



Photo: Tazariya Mounir, USAG Natick Public Affairs



Photo: Dr. Caroline Davis, NSRDEC Cognitive Science Team



Training for Your Brain

Natick scientists investigate ways to help Soldiers recover from stress

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (Sept. 2, 2015)

Soldiers can't avoid stress, but researchers at the Natick Soldier Research, Development and Engineering Center, or NSRDEC, are leading a study to investigate ways to help Soldiers increase their cognitive resilience under stress.

NSRDEC is working in collaboration with the Human Research and Engineering Directorate, or HRED, at the U.S. Army Research Laboratory, or ARL, located at Aberdeen Proving Ground.

"A Soldier who is out in the field in a battle-type context is under very high demands – mentally, emotionally and physically," said Dr. Marianna Eddy, a research psychologist on NSRDEC's Cognitive Science Team. "They can be emotionally and physically fatigued. Cognitive resilience is the ability to perform well under those stressors. Perform-

ing well can mean a variety of things, such as making a good decision. For instance, deciding whether to call for reinforcements or making a split-second shoot or not-to-shoot decision."

"We are interested in characterizing individual differences in the way that cognitive processes can break down under stress," said Dr. Caroline Davis, who has a background in emotion, stress and anxiety research and is a research psychologist on NSRDEC's Cognitive Science Team. "During an acute stressor, some people are able to maintain peak performance much better than others. Our goal is to identify metrics that predict such individual differences, and to use this information to develop training strategies that will allow all Soldiers to maintain optimal cognitive performance both during and immediately following extreme stress."

NSRDEC and Tufts University, which jointly created the Center for Applied Brain and Cognitive Sciences, are also conducting a parallel effort examining cognitive resilience in the civilian population.

"The work at the center can be used as a foundation for the work we are doing in collaboration with ARL-HRED," said Eddy.

"The studies we are conducting at the Center for Applied Brain and Cognitive Sciences are being conducted in a lab where we have tight experimental control," said Davis. "Our collaboration with the Cognitive Assessment and Simulation Engineering Laboratory at ARL-HRED allows us to move these laboratory-based studies into a somewhat more realistic, Soldier-relevant environment."

Stress affects a Soldier's memory and decision-making as well as the ability to act and react.

"We want to know what it is that allows some people to overcome these challenges and perform well," said Eddy. "People can tell us about their coping mechanisms, but we are also interested in what is going on in their brains. To do this, we are running an electroencephalography (EEG) study in collaboration with the Translational Neuroscience Branch at ARL-HRED. We outfit the Soldiers with an EEG cap and some other sensors that measure physiological responses to emotional stimuli, such as changes in breathing patterns, sweat responses and facial muscle activity."

"We are also looking at the way that personality traits, such as impulsivity or emotion-regulation style, interact with an individual's biological stress response to promote resilience," said Davis.

Finding ways for Soldiers to become more cognitively resilient may help increase Soldier performance and possibly improve decision-making, effectiveness and survivability.

"We have a unique ability to impact the Soldier," said Davis. "I am excited to be entering this rapidly growing field that has recently started to attract a lot of attention, and I think that we have real potential to improve life for the Soldier."

"It's rewarding to interact with Soldiers and see that they are excited about what we are doing," said Eddy.



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One step at a time



As researchers from the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center continued their Physical Demands Study, two women Soldiers graduated Aug. 21 from Ranger School, becoming the first of their gender to do

so. USARIEM is working with the U.S. Army Training and Doctrine Command to provide valid, reliable and accurate predictive tests to select Soldiers for physically demanding occupations. Capt. Kristen Griest, center, an MP with 716th Military Police Battalion, Fort Campbell, Kentucky, and 1st Lt.

Shaye Haver, an Apache pilot with 4th Combat Aviation Brigade, 4th Infantry Division, Fort Carson, Colorado, started training with the first gender-integrated Ranger Course, Class 06-15, in April. Both Griest and Haver are graduates of the U.S. Military Academy, West Point, New York.

Photo: Staff Sgt. Scott Brooks



Banner Day

An all-female flag detail prepares to raise the American flag Aug. 21 at Natick Soldier Systems Center in observance of Women's Equality Day, which was officially celebrated Aug. 26. A Women's Equality Day Honoree Display was presented in the Building 1 lobby through the end of August. This year's Defense Equal Opportunity Management Institute theme was "Celebrating Women's Right to Vote."

Photo: Bob Keener, USAIG Natick Public Affairs

