



## Cold-Weather Concrete

*SpringBoard and the Cold Regions Research and Engineering Lab (CRREL) provide manpower, logistics, support, and funding for successful cold-weather concrete demonstrations*

In 2008 SpringBoard was the recipient of the National Association of Development Organizations Innovation Award for demonstrating applicability of cold weather concrete in Juneau and Fairbanks, Alaska. This technology is edging closer to technology transition as other groups examine it more closely.



**SUCCESS**  
*Stories*

Cold-weather concrete utilizes off-the-shelf, commercially-available admixtures that depress the freezing point and accelerate the setting time, allowing the concrete to cure properly, even at temperatures below freezing. Because concrete loses strength as it freezes, contractors are often forced to build warming tents over projects toward the end of the building season or during winter months. This new approach to cold weather concreting extends and eases the pressures of an already overburdened construction season in Alaska and other cold regions.

The 2008 pour at Ft. Wainwright near Fairbanks brought together, as collaborators, CRREL, the US Army, private contractors, the State of Alaska, university researchers and design engineers who are looking at this seriously for upcoming projects in the winter of 2008-09.

Applications include military and civilian projects, particularly significant in remote areas where heated enclosures are impractical. The mixture can be poured on frozen ground and needs only to be covered with a light insulation blanket. In 2007, at the Cold Climate Housing Research Center, Fairbanks, two pours were successfully made on days when the low temperatures overnight were -25 degrees Celsius.

“With energy costs skyrocketing and increasing costs to build enclosures for normal winter concrete pours, this cold-weather concrete technology is looking better all the time,” says Dr. Charles Korhonen, a retired CRREL engineer who consults to SpringBoard. “Work still needs to be done to refine the process, but we are getting there.”

The 2008 field demonstration was conducted as a part of the Installation Technology Transition Program (ITTP). This ACSIM—Assistant Chief of Staff for Installation Management—sponsored effort transfers innovative technologies that improve infrastructure design, operation, and maintenance on Army installations.

The Marine Corp is interested in learning more about cold-weather applications. With the assistance of T2Bridge, new Cooperative Research and Development Agreement (CRADA) opportunities are being explored.

## CryoConn-Cryosphere Connections

*Cold Regions Research & Engineering Laboratory (CRREL), National Aeronautics and Space Administration (NASA), and University of Alaska joined forces to offer a content rich teacher training for middle and high school teachers*

Building on NASA's History of Winter program SpringBoard organized the necessary partnerships to create the CryoConn (Cryosphere Connections) event. CryoConn is a professional development workshop that focuses on the role of the cryosphere on earth systems and the science of winter. It examines the amazing properties of snow and ice and their implications for life on this planet. CryoConn invites teachers and students to step outside the school house door and explore the world of winter. The workshop's content and instructional strategies have relevance to any northern area where ice and snow abounds during the winter months.

The curriculum builds on NASA's History of Winter educational outreach program, Cold Regions Research & Engineering Laboratory's (CRREL) research in the Arctic, the International Polar Year's extensive studies, and the rich cultural and scientific knowledge base of Alaska's indigenous people who make the Arctic their home.



In February 2009, twenty-three classroom teachers, and five faculty from the University School of Education came together for the three day inaugural CryoConn workshop at Chena Hot Springs Resort near Fairbanks, Alaska. Teachers had the opportunity to learn from and work alongside scientists from NASA, CRREL, and the University of Alaska, Fairbanks.

During the workshop the attending teachers began providing feedback which reinforced how important winter science can be for educators and students alike.

Here are a few of their comments.

"This workshop was like a real life Discovery Channel for me. I can't explain what a phenomenal experience this was and the lasting impact it will have on my classroom, my students, and me personally. Thank you so much for this opportunity."

"Meeting leaders and legends of the scientific community was inspiring! This event generates enthusiasm that will follow me to the classroom and onto my students."

There is a wealth of research underway in Alaska and across the globe, assessing the impact of climate change and building an understanding of the complex interplay of forces at work within the Arctic ecosystem and cryosphere. Climate change is coming to Alaska in profound and measurable ways. The International Polar Year has spotlighted the Arctic and biologic changes that are occurring at unprecedented rates. The Alaska scientific and cultural context offers a rich base to begin a professional development program to engage and equip teachers, in Alaska and across the northern United States, to use winter as a natural laboratory, particularly in the context of our growing understanding of the earth's climate systems.

**SUCCESS**  
*Stories*



## HAMMER™ Handheld Apparatus for Mobile Mapping and Expedited Reporting

*ERDC technologies offers an efficient solution to the problem of acquiring and processing multiple streams of critical information in real time*

Researchers with the U.S. Army Engineer Research and Development Center (ERDC) conceived, designed, and developed the HAMMER™—Handheld Apparatus for Mobile Mapping and Expedited Reporting. The instrument integrates a broad spectrum of high resolution, geospatial, and sensor data in an accurate, digital, objective, and consistent manner. This fine-grained data can be seamlessly organized into a relational database for automatic report generation. The HAMMER™ integrates customized technologies for capturing and sharing actionable intelligence in real-time. This intelligence can be shared between users and decision-makers as a “common-operating-picture” to forecast, prevent, and mitigate events proactively.

Under a Cooperative Research and Development Agreement (CRADA), ERDC and industry partner Compass Systems, Inc., developed the HAMMER™ into a commercial product. In 2008 the technology transferred to Compass Systems.



Capabilities of the HAMMER™ include:

- robust computing integrated with a geographical information system
- sophisticated global positioning system enabling stand-off position acquisition
- high definition camera/video
- night vision
- speech recognition, and
- wireless, multi-sensor mesh networks for tagging and tracking assets or events dynamically.

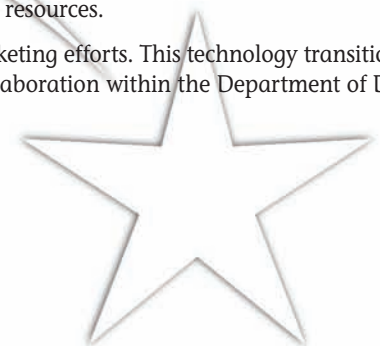
Commercial applications include energy and resource management, real property evaluations, risk and condition assessments, as well as meeting the diverse needs of first responders, construction, real estate, municipality management, fish and wildlife management, forestry, highways, and manufacturing.

The HAMMER™ is also an excellent tool for meeting current and future demands of our nation's civil works and defense programs. For example, another ERDC facility, Coastal Hydraulics Laboratory (CHL), entered into a CRADA in 2008 with Compass Systems to configure HAMMER™ to meet their needs.

Charged with stabilizing and protecting our nation's shorelines, researchers with CHL realized the benefits of this technology for improving and standardizing their inspection procedures. The HAMMER™ hardware/software solution allows the inspector to remotely collect geo-referenced images/media and associate them with specific fields on the forms. The benefit of this system is that it allows multi-perspective, stand-off data collection with increased safety. This allows the inspectors to collect vital information in a measurable, repeatable, and comparable manner; suitable for generating and compiling an accurate condition index, as well as for ranking and prioritizing resources.

SpringBoard is currently working with Campass Systems in their marketing efforts. This technology transition, facilitated by Springboard and TechLink, is a great example of the collaboration within the Department of Defense Partnership Intermediary Network.

**SUCCESS**  
*Stories*



## Teachers get their “Hands-On” Materials

*ARDEC, NASA, and CRREL give more students the chance to work with real materials in the classroom*

Over the last year several pilot projects sponsored by SpringBoard successfully brought engaging, effective classroom practices into the schools, offering teachers training and tools needed to build Science, Technology, Engineering and Math (STEM) capacity. The goal is to move students into “doing science,” piquing their interest while building fundamental skills. In 2007 and 2008, SpringBoard piloted three professional development programs to improve STEM education in Alaska: Materials World Modules (MWM), History of Winter, and GIS arc mapping and GPS training. Each program included training for teachers in content, materials needed to implement each curriculum, and follow-up support when necessary.



With support from the US Army Armament Research, Development and Engineering Center (ARDEC) and MWM brought pre-engineering skill sets to 30 middle and high schools from the remote village of Crooked Creek (K-12 school population 35) to the largest school district in the state, Anchorage (49,000 students). ARDEC formed educational partnerships with multiple school districts in Alaska for continued support.

“One thing about sports materials is that they are everywhere. Even if village students have not played golf, they can still relate to the significance of choosing the right material for the game being played,” commented University of Alaska Professor of Education, Susan Barstow. Forty pre-service teachers graduating from UA will soon bring MWM and inquiry based practice into classrooms across the state.

Evidence to the value of MWM, 73 percent of Alaska teachers surveyed rated “student engagement” in MWM as a five on a scale of 1-5.

History of Winter, a cryosphere science program led by NASA and Cold Regions Research and Engineering Lab (CRREL) scientists, offers meaningful strands for classroom application. Thermocrons, an affordable data collection tool, allows individual and small groups of students to collect and analyze large sets of temperature data. Curriculum links to climate change and Arctic science makes several of the instructional strands relevant to students—in Alaska and beyond.

GIS arc mapping and GPS technologies in science classrooms and field research are engaging Juneau students. During the last school year, 473 middle school students worked with GIS/GPS technology, building on National Science Foundation funded teacher training. With support from SpringBoard, students embarked on research projects including mapping of Paralytic Shellfish Poisoning (PSP) hot spots along Juneau’s coastline, geo-caching, and mapping of earthquake/plate boundaries.

**SUCCESS**  
*Stories*





## Lego Robots Inspire Future Engineers

*Kids across Alaska are making "climate connections" in this year's FIRST Lego League challenge.*

Inventor Dean Kamen founded FIRST, For Inspiration and Recognition of Science and Technology, with the vision to "...create a world where science and technology are celebrated... where young people dream of becoming science and technology heroes... where kids learn it's more fun to design a video game than it is to play one."

The FIRST Lego League (FLL) is a competition for students ages 9-14 that combines research, robot programming and teamwork into one high

octane competition. Students spend as many as fifteen hours per week preparing for the competition. At FLL tournaments, competitors are judged by teams of educators and engineers. In Juneau, Alaska, this includes civil engineers from the US Coast Guard. The Civil Engineering Unit of the Coast Guard has signed an educational partnership agreement with the Juneau School District for ongoing support of the program.



**SUCCESS**  
*Stories*





## SeaPerch Underwater Robotics

*Springboard, in cooperation with the Naval Undersea Warfare Center in Keyport, Washington, the Office of Naval Research, the Society of Naval Architects, and Marine Engineers and the National Defense Education Program, is introducing students to the world of underwater robotics*



In 2009, SpringBoard will facilitate training for over 50 teachers to build their own remotely operated vehicles (ROV) out of PVC piping and other small parts that are easy and affordable for schools to obtain. Past workshops have been overwhelmingly successful. Teachers have commented that “things were hands-on and engaging from beginning to end”, and 100 percent of participants would recommend the workshop to their colleagues.

The ROV program, called SeaPerch, is part of the Office of Naval Research’s initiative, “Recruiting the Next Generation of Naval Architects.” The program teaches students how to build a propulsion system, how to develop a controller, and how to investigate weight and buoyancy. The marine engineering theme also includes basic skills in ship and submarine design, encourages students to explore naval architecture, and marine and ocean engineering concepts independently.

The SeaPerch program has been a nationwide success, and its rapid growth in Alaska is the direct result of the partners involved in the outreach. Since its initial introduction to educators in the summer of 2008, it has been adopted by teachers in eight different school districts across the state, impacting approximately 1,000 students annually. One teacher commented that the SeaPerch workshop was, the “best workshop I’ve ever attended. The workshop was fun and full of opportunities to enrich my science program.”

The Naval Undersea Warfare Center in Keyport, Washington supports the SeaPerch program with their professional engineers that are available to support the teacher training events. We credit much of our workshop success as a result of the participation of the Keyport engineering staff. Another great success story is that all of the participating school districts currently working with SeaPerch have signed Educational Partnership Agreements with the Navy. This summer, the Navy’s engineering participation will be complemented with local NOAA scientists that will jointly focus on research applications for ROV’s.

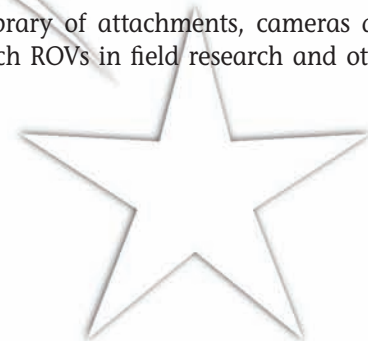
In Southeast Alaska, NOAA is also supporting SeaPerch by supplying storage space for supplies and dedicating staff time for outreach relating to the program. NOAA scientists are available as guest speakers and technical consultants as students build their SeaPerch’s. NOAA and SpringBoard are also working on developing a lending library of attachments, cameras and hydrophones for example, that can be used with the SeaPerch ROVs in field research and other experiments.

**SUCCESS**  
*Stories*



**jedc.org**

612 W. Willoughby Ave., Suite A  
Juneau, AK 99801  
907-523-2300 • 907-463-3929





## Stabilizing Marginal Soils

*Engineer Research and Development Center–Geotechnical and Structures Laboratory (ERDC–GSL) partners with small Alaska firm to seek a cost-effective solution for stabilizing pads, roads and runways for remote locations*



Civil Technologies, LLC, a small Alaska business, pioneered a soil stabilizing system that combines fibrillated polypropylene fibers (geofibers) with a synthetic fluid binder. An 180,000 square foot storage pad, made entirely of poorly graded beach sand was treated and immediately put to use as a staging area for oil field equipment, including a 500-ton drill rig.

First approaching this project as a spin-in technology to the Department of Defense, SpringBoard learned that Civil Technologies conceived the idea for the methodology informally with a researcher from the US Army's Engineer Research and Development Center–Geotechnical and Structures Laboratory (ERDC–GSL). With the window for filing a patent closing fast, SpringBoard with Tech-Link's assistance, facilitated the patent filing. The application was filed by ERDC attorneys May 1, 2008 and included the co-inventors.

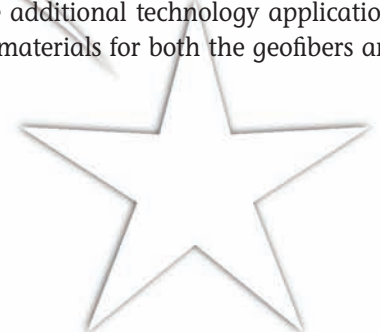


This technology has broad military and civil applications, well beyond the borders of Alaska. Any area dominated by marginal soils is a candidate for application. In addition to supporting oil field operations, airfields and roads can be installed quickly and cheaply—something of great value to our mobile military forces.

We further expect that the circumpolar regions, remote desert regions of Iraq, and the difficult terrain of Afghanistan may be other areas where this technology will provide a rapid, cost effective solution for stabilizing local marginal soils to build pads and roads.

SpringBoard is providing Civil Technologies assistance to develop a commercialization plan for the methodology. In addition, Civil Technologies and ERDC–GSL have signed a Cooperative Research and Development Agreement (CRADA) to explore additional technology applications and to develop new environmentally friendly and less costly materials for both the geofibers and the synthetic fluids.

**SUCCESS**  
*Stories*



## Solid Waste Management Technologies

*NAVSEA Carderock Division engineers offer an interesting alternative for Southeast Alaska for managing solid waste*

Waste management, particularly solid waste and plastic, is a huge issue in rural Alaska. Remote towns and communities in the Southeast Alaska region are similar in many ways to US Navy ships. Both must be self-sufficient and perform solid waste management and waste disposal independent of shore side services to enable sustained operations for long periods of time. SpringBoard recognized an excellent opportunity to transfer technology developed by the Navy for use in Alaska communities.

At the NAVSEA Carderock Division, engineers design, test and evaluate military mission compatible, efficient, and cost-effective shipboard environmental systems. This allows ships to train and operate unrestricted by environmental constraints, minimize waste generation, eliminate the use of harmful chemical compounds, and destroy or appropriately treat wastes on board ship. The town of Wrangell, with a population of about 2,100 (slightly less than the crew size of an LHD WASP-1 Class or LHA TARAWA-1 Class ship), is located on the northern tip of Wrangell Island in the Alaska Panhandle. Solid waste management for Wrangell is challenging and costly due to its remote location and geographic limitations.



The Wrangell landfill, like many in remote Alaska towns and villages, is near capacity. Wrangell would like to eliminate the requirement to ship their solid waste out-of-state while minimizing the additional burden on the local landfill.

As technical experts for the US Navy on solid waste management for surface ships and submarines, the Environmental Quality Division at NAVSEA Carderock Division is in a unique position to assist Wrangell in developing a solution to meet their solid waste management objectives. The two parties are collaborating through a Cooperative Research and Development Agreement (CRADA) on the development of an acceptable solution to the town's solid waste management issues. Wrangell will benefit from the identification and eventual implementation of a cost-effective solution to meet their solid waste management needs. The US Navy will benefit from the resulting integration and operation of the solid waste technologies which could have potential future applications on Navy ships and to support deployed military ground forces.

**SUCCESS**  
*Stories*





## Summer—Prime Time for Science

*Underwater Acoustic Specialists with the Naval Undersea Warfare Center in Newport, Rhode Island will lead middle school students in discovering the underwater world of sound*

Summer is a great time to inspire and engage students in STEM (Science, Technology, Engineering, Math) fields. It offers a unique time to inspire kids without the typical restrictions of standards, testing and scheduling. Educational research tells us that summer is a time when a significant amount of learning can be lost, a reality that can be offset by summer learning opportunities.

Partnerships make the Summer Science Camps possible. In 2009, SpringBoard has partnered with a variety of state and federal agencies as well as private businesses to create five summer camps for students, grades 4–12. These camps are made possible by seed funding from the Department of Defense with the goal of improving science, technology, engineering



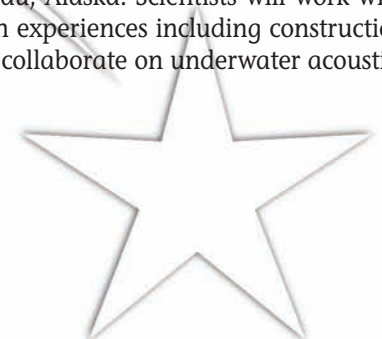
and math (STEM) education in the United States. That investment is leveraged and matched by contributions of staff time and resources available regionally—including NOAA, National Marine Fisheries Service & National Weather Service, Alaska Department of Fish & Game, the National Park Service—Glacier Bay National Park, the University of Alaska, Alaska Electric Light & Power, and other private businesses.

Ingredients for great summer programs include small groups of students, active learning, and an adventure or challenge that intrigues students

Three exemplary science camps will be offered in Alaska during the summer of 2009. High school students have the opportunity to perform field research in the Bering Sea, Little Port Walter, and Glacier Bay with professional scientists and university faculty through the Alaska Summer Research Academies (ASRA) at University of Alaska Fairbanks, and Discover Design Research (DDR) at University of Alaska Southeast. These camps bring together expertise and resources from the University of Alaska, Alaska Department of Fish & Game, National Oceanic and Atmospheric Administration (NOAA), the National Park Service and the Navy. These camps are creating new opportunities for collaboration between agencies and scientists, while engaging and inspiring young researchers.

In July, scientists from the Naval Undersea Warfare Center in Newport, Rhode Island will team with scientists from the NOAA for a two-week “Sun to Sea Summer Science Camp” for middle school students at the NOAA Auke Bay Laboratory in Juneau, Alaska. Scientists will work with local educators to deliver two-full weeks of exciting hands-on experiences including construction of SeaPerch ROV’s. The camp also provides the opportunity to collaborate on underwater acoustics technologies and applications for research in Alaska waters.

**SUCCESS**  
*Stories*





## Assuring Secure Data Transfer for Sensitive Networks

*Naval Research Laboratory (NRL) technology is successfully commercialized by an Alaska enterprise*

With the inception of computer networking the increasing interconnectivity has resulted in an ever increasing need to provide secure, protected data transfers. Most existing high-security systems are large-scale, cross-domain solutions which can be costly, as well as restrictive to the types of applications, data, and network architectures involved.



The Trapline Network pump manufactured by Sequestered Solutions Alaska, LLC (SSA) is a high-security computer hardware device that allows one-way data transfer into higher classified security networks while maintaining acknowledgement protocols between the two networks, guaranteeing that the information is successfully received without the potential of compromising data that is resident on the high-security side.

The base technology was developed by the Naval Research Laboratory (NRL) and demonstrated by NRL's Center for High Assurance Computer Systems Branch.

With the help of SpringBoard, SSA obtained both exclusive and non-exclusive patent license agreements and commercialization rights for the Trapline technology. Since licensing, the Trapline has been enhanced to support IEEE 802.3u 100 Mbps protocols, so that the increased bandwidth allows several applications to run concurrently through the Trapline. Furthermore, it can be used in a multi-level distributed architecture where data transfer occurs across trusted and non-trusted networks. The result of this approach is that the Trapline has been certified by the National Security Agency.

SSA's is evaluating opportunities to expand its reach and sell its services to a broader market. SpringBoard conducted an analysis for SSA which included potential commercial and government customers.

With the business support of SpringBoard and the completion of Trapline's productization, SSA has secured a contract with several governmental agencies and has achieved its first commercial sales success.

**SUCCESS**  
*Stories*

