



Photo courtesy of North Carolina State University



NEWSLETTER

The Newsletter of the First Responder Technologies Program

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This Newsletter discusses technologies of interest to first responders that have received funding, in part, from the Federal government. Mention of these technologies should not be construed as an endorsement of either the technology, or the entity producing it, by the Federal government.

To download a copy of this newsletter, visit:
<http://www.firstresponder.gov/Pages/NewsLetterPage.aspx?NewsLetter=current>

BREATHING EASY

Smaller, Lighter SCBA for First Responders

First responders in the past had little or no respiratory protection in fires, low-oxygen atmospheres, hazardous material releases, or other environments that are immediately dangerous to life and health. The development of the self-contained breathing apparatus (SCBA) in the mid-twentieth century made it possible for first responders to work in these atmospheres. Nevertheless, today's SCBA units are heavy and cumbersome. The size (13 inches in profile) and weight (as much as 35 pounds) of modern SCBA gear can slow down first responders, add to fatigue and heat stress, and create problems in tight spaces and debris-filled areas. To overcome these challenges, a smaller, lighter, and more flexible SCBA is in development.

The International Association of Fire Fighters (IAFF) is under contract through the TechSolutions program of the U.S. Department of Homeland Security (DHS) Science and Technology (S&T) Directorate, to develop Firepack, the next-generation SCBA. The new technology, invented by Stan Sanders of Sanders Industrial Design, replaces the traditional bulky air bottle with a series of smaller, lower-profile, air cylinders connected by a patented manifold. The new SCBA cylinders are made from Hytrel, a high-temperature plastic pressure vessel. According to Richard Duffy, Assistant to the IAFF General President, Hytrel is extremely strong. "It won't fragment, which means that it can be filled while being worn, and there is no loss of air through permeation. We've kept helium and nitrogen in these vessels for two years with no permeation," said Duffy.

"It is the biggest change to SCBA in more than 30 years," said DHS Director of TechSolutions, Greg Price.

Firepack will be 7.8 pounds (including its harness), as opposed to 35 pounds for current gear, and less than 2 inches in profile versus the current 13. In addition to lessening fatigue and heat stress, the new design makes it easier to move in tight spaces and reduces the likelihood of becoming entangled in debris. The next-generation SCBA will provide 45 minutes of air – the same volume as most conventional SCBA

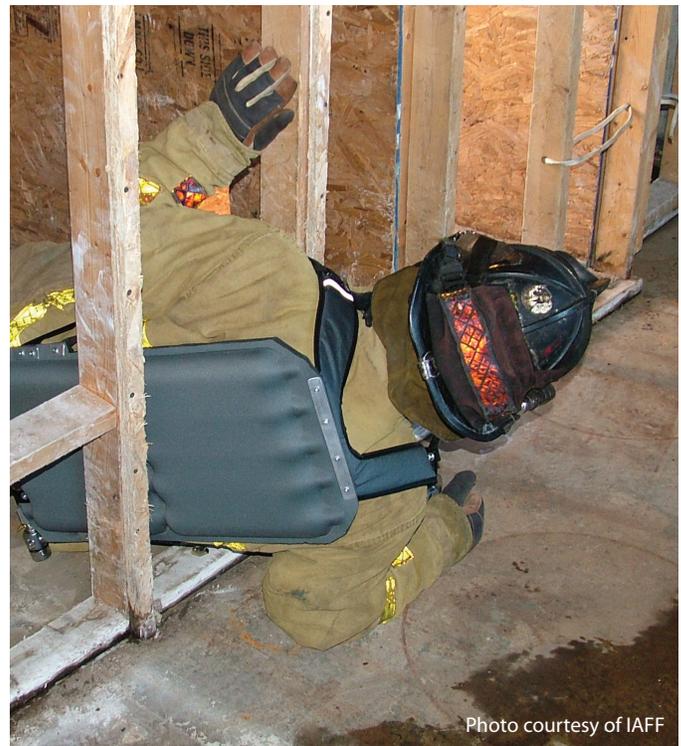


Photo courtesy of IAFF

Above, a firefighter demonstrates the ability to move through a tight space with the Firepack SCBA. Traditional canister-style SCBA do not offer the same flexibility, as shown below.



Photo courtesy of IAFF

(Breathing Easy continued)

bottles. Unlike conventional SCBA bottles, users will get nearly 45 minutes of working time from the newer units, as they will be less fatigued using them and active longer. The Firepack prototype has been integrated and tested with currently available SCBA face pieces, regulators, air hoses, connectors, and filling systems.

A smaller, lighter SCBA could be used by first responder groups other than firefighters. "It offers tremendous potential to improve response by law enforcement and others involved in anti-terrorism protection," said Jose Vasquez, DHS S&T Director of First Responder Technologies.

The next-generation SCBA should be commercially available by fall 2009. The next step is to gain approval from the Department of

Transportation (DOT) to transport compressed air in composite plastic containers. The team must also obtain test and safety certifications through the National Institute of Occupational Safety and Health (NIOSH) to commercialize the technology and use it in an operational environment. The SCBA units will then need to be certified to the National Fire Protection Association (NFPA) standard for firefighter respiratory protection.

TechSolutions is an element of the First Responder Technologies program (R Tech) of the U.S. Department of Homeland Security Science and Technology Directorate. The goal of TechSolutions is to help develop technologies that fill capability gaps identified by the emergency response community. For more information about TechSolutions, visit www.dhs.gov/TechSolutions.

UNDER THE SEA

Underwater Robot Offers a Solution in Explosives Detection

A new technology will soon be available to meet the unique needs of maritime first responders, who are protecting our nation's ports and vessels. Researchers at ICx Technologies and the Homeland Security Advanced Research Projects Agency (HSARPA) Rapid Technology Application Program (RTAP) are developing an underwater robot to detect submerged explosive threats.

At the core of the underwater bomb detection system is SeaPup – an ultra-sensitive, lightweight explosives detector adapted from ICx Technology's Fido-model explosives detectors. The Fido-model detectors are used by the U.S. Park Police in Washington, D.C. to screen Fourth of July spectators on the National Mall and by the U.S. military in Iraq and Afghanistan. The Fido-model detectors rely on proprietary amplifying fluorescence polymers (AFPs) to detect miniscule (i.e., as low as parts-per-quadrillion) amounts of explosive materials. Using AFPs is a new approach to explosives detection, which has traditionally been done using ion mobility spectrometry (IMS). AFP technology offers the potential for greater detection capabilities than



Photo courtesy of ICx Technologies

IMS-based systems in far less space, allowing it to be used in space-critical settings, such as the inside of the SeaPup. In addition to the AFP technology, the SeaPup employs new sensors that can identify chemical, biological, radiological, and nuclear threats. SeaPup can also gather and store water samples for later study at a lab. SeaPup uses a sound system to alert users to potential explosives and other dangerous materials.

(Under the Sea continued)

SeaPup looks like a submarine and attaches as a robotic payload to most underwater robotically operated vehicles (ROVs) with minimal integration requirements, and can operate at depths up to 100 meters. SeaPup is approximately the size of a backpack and is connected to the surface by a tether that contains a fiber optics system. The fiber optics enable an operator to control the ROV and SeaPup using a joystick, as well as retrieve data from the robot in real time.

The system is still in testing, but it is now available to first responders. During testing in 2007, SeaPup successfully located a 500-pound bomb one mile off the Hawaiian coastline at Ordnance Reef in Oahu.



This image is from a test-run off the coast of Hawaii. The SeaPup is combing the ocean floor and transmitting images in real time.

The Office of Naval Research (ONR), which contributed funding to the development of SeaPup, stated that the products will be highly beneficial to maritime safety. Dr. Linda Chrisey, program officer in bioprocesses, biomaterials, and bio-inspired systems at ONR, said "I think they hold great promise for use for port security, finding underwater IEDs, and also for military underwater range environmental applications."

Researchers at ICx feel confident that the tool will be used by the government and first responders once they discover its potential in threat detection and underwater rescue. ICx researchers hope the device can have a forensics application by detecting everything from lost handguns to dumped explosives.

In addition to technology, first responders across the Nation have identified as a need specialized training to protect ports and vessels, from those on the coasts of the United States to those on our rivers and lakes. The Rural Domestic Preparedness Consortium (RDPC) has recently announced a new, tuition-free course, certified by the U.S. Department of Homeland Security, which relates to uses of SeaPup by preparing communities for security challenges which may affect their maritime operations. The course, AWR 144 – Port and Vessel Security for Public Safety and Maritime Personnel, was developed by the University of Findlay. Taught as an eight-hour, instructor-led, awareness-level course, AWR144 examines the regulatory framework and security requirements currently in place at the maritime facilities located in communities across the Nation. The roles of the facility owner and vessel security officer are also examined. The course details the security measures and training mandated for maritime facilities and the personnel employed in those facilities. Recent developments, such as the Transportation Worker Identity Credential (TWIC) program and the federal SAFEPort Act, are discussed. Students will leave the class with a better understanding of how to respond to emergencies in maritime facilities. While the course was developed with a rural audience in mind, its teachings may be applied to any audience who requests it, as evidenced by a recent delivery in the Port of Albany in the State of New York. For further information on the course, contact RDPC at 859-622-8994 or info@ruraltraining.org.

For more information about ICx Technologies, visit www.icxt.com.

PUTTING PROTECTION TO THE TEST

New Textile Lab Offers In-House Research on Protective Gear



Photo courtesy of North Carolina State University

The Textile Protection and Comfort Center (T-PACC) at North Carolina State University (NCSSU) is known for its research on, and investigations of, different types of first responder protective clothing. Investigators at T-PACC test garments of all sizes, ranging from fabric samples to full outfits. Their assessments consider both the protection the clothing offers against on-the-job hazards and comfort. To improve its ability to ensure that clothing measures up, T-PACC has added the Man-in-Stimulant-Test (MIST) Lab.

Funded by a \$2 million Department of Defense (DoD) grant, the facility is the first of its kind to be located at a university. The MIST Lab includes a chamber in which protective clothing will be tested for resistance to heat as well as various non-lethal vapors similar to biological and chemical agents found during real emergency situations. These "mists" will be sprayed on clothes worn by both mannequins and live participants in the lab. Subjects will also complete tasks that simulate common first responder activities, such as carrying a victim to safety and climbing a ladder. The temperature and vapor concentration of the environment can be regulated during testing. Participants' personal protective equipment (PPE) will then be examined to determine the level of protection afforded during the tasks.

Roger Barker, director of T-PACC, said, "The new MIST Lab increases our ability to provide accurate studies of PPE in a timelier manner and will accelerate the development process for new types of protective clothing." Although the MIST Lab is not fully up and running, it should be ready for use by 2009. According to Barker, the MIST lab has already contributed to advances in clothing tests. Shawn Deaton, a special project director at T-PACC and an oversight project manager at the MIST Lab, stated that non-governmental labs like MIST are in short supply. In fact, the idea for the MIST Lab started in 2007 when researchers working on a chemical-biological fire suit had to go outside the country to test the garment.

A professional staff of scientists and engineers interprets and analyzes the results of the research in the lab. Access to the lab will not be exclusive to those who work at the facility. "We will work with faculty at NCSSU and anyone [else] who is interested," Barker explained.

For more information about T-PACC, visit www.tx.ncsu.edu/tpacc.



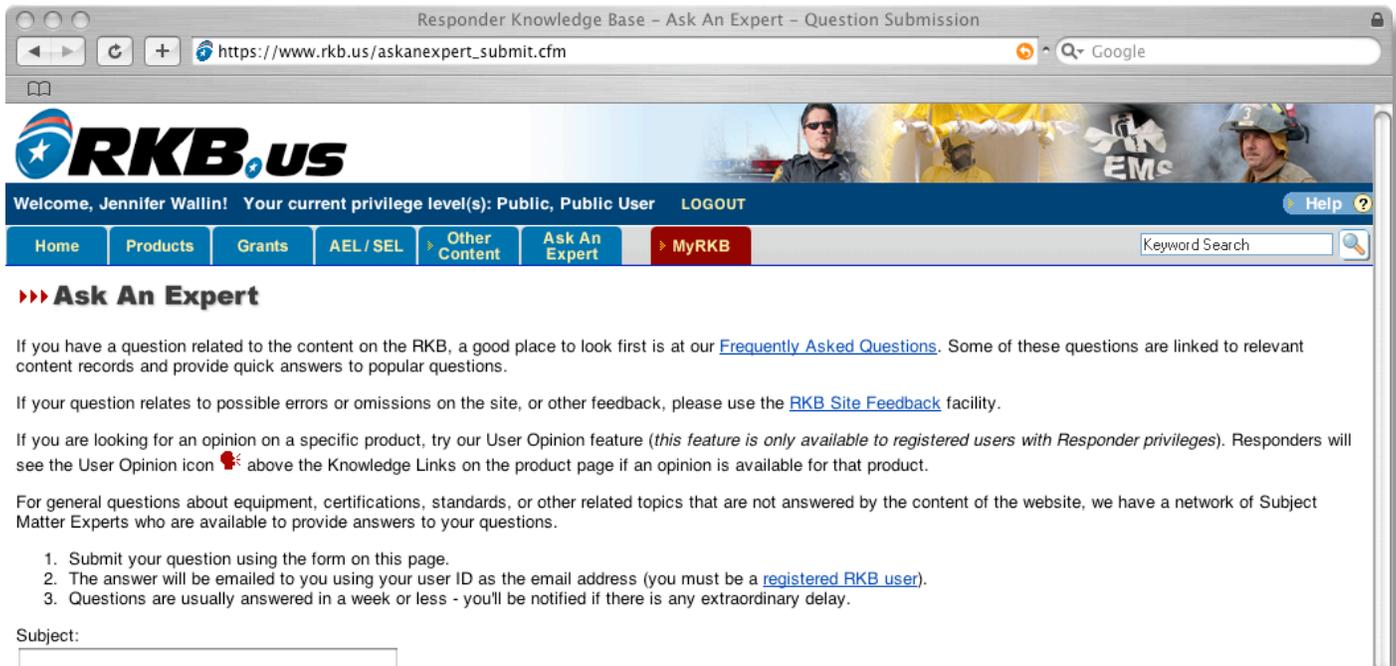
Photo courtesy of North Carolina State University

Closed circuit video conference room where sponsors view their garment being tested throughout the MIST evaluation.



THE RESPONDER KNOWLEDGE BASE

RKB's Ask an Expert Feature



Registered users of the Responder Knowledge Base (RKB) have access to the [Ask an Expert](#) tool through which they can submit a question on any topic related to the RKB or first responders.

Questions submitted to the tool are directed to subject matter experts (SMEs) who support the RKB. These questions may relate to equipment, certifications, standards, or other topics on the RKB Website. The tool can also be used to ask about first responder trends, policies, and procedures.

Submitting a question is simple: enter the question in the form supplied under the *Ask an Expert* tab, and click "Submit Question." The user will receive a response within five or fewer business days at their registered e-mail address. Questions that require extensive research may take longer to be answered. In such cases, the RKB will notify the user of the delay.

Users may first want to check the *Frequently Asked Questions* section of the RKB before submitting a question to *Ask an Expert*, to see if the answer is already posted.

Additionally, users should be aware that although RKB personnel cannot provide user opinions through *Ask an Expert* or any other method, access to user opinions from the first responder community are available through the *Feedback* section of the Website (see related article in the [July 2008 issue](#) of the *R-Tech Newsletter*).

For more information, visit www.rkb.us. For questions or suggestions, e-mail info@rkb.us.