PURE INNOVATION

A water-purification solution benefits both Warfighters and civilians

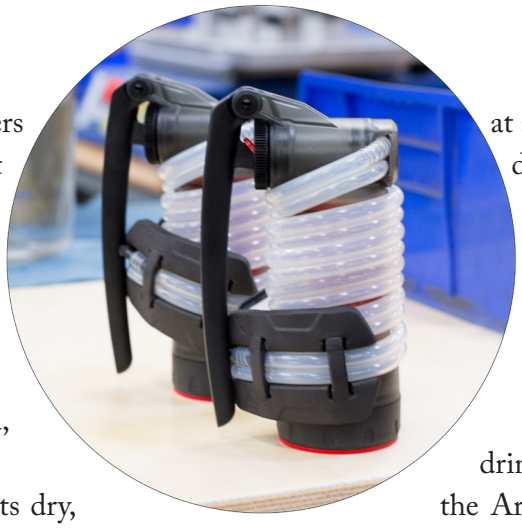

Photo courtesy Cascade Designs

What do expedition hikers on the Pacific Crest Trail have in common with U.S. Warfighters on the ground in Afghanistan? Among other things, both groups need to tend to their most basic requirements: food, shelter, clothing, and, perhaps most of all…water.

Like the 2,650-mile trail with its dry, 30-mile stretches, soldiers in harsh climates are often faced with limited access to clean water, a limitation that poses a serious threat not only to the success of a given operation but to the very survival of the Warfighters.

In a conflict zone, when treating local water isn't an option, the standard operating procedure has been to airdrop water bottle packages from planes or helicopters. But in locations such as Iraq and Afghanistan, wherein a few minutes of exposure to hostile fire might be lethal, that bottled water might come at a huge cost. And at other times, soldiers might be wading through what seems to be clean water, wondering why they can't just bend down and take a drink. But endemic contamination, invisible and often tasteless, poses its own risks.

In order for Warfighters to drink from indigenous water sources, the Army needed an affordable, fast, single-pass solution that would address viruses, be resistant to freezing and thawing, and be simple to use by anyone, anywhere, anytime.

In 2008, the U.S. Army issued a Request for Information to the domestic water purification market. The Army was interested in commercially available, off-the-shelf, water treatment devices that troops in the field could use easily and efficiently. Finding nothing suitable for the harsh conditions faced by the warfighter, a Small Business Innovation Research (SBIR) solicitation was issued to encourage small busi-

nesses to compete for the research and development of an innovative water purification device robust enough to meet Warfighters' needs.

"The SBIR program allows us to reach out and build partnerships that may not otherwise exist," said Jeffrey Pacuska, team leader for the soldier clothing and configuration management team at the Natick Soldier Research Development and Engineering Center (NSRDEC or Natick Labs). "We utilize the SBIR program to facilitate the incorporation of novel technologies that come out of small businesses and parts of the American industrial base that we don't always have the opportunity to work with. We take those technologies and put them into soldier platforms where we can have a defined impact on soldier survivability and lethality."

Mountain Safety Research (MSR) and its parent company, Cascade Designs, addressed the Army's needs. Responding to the SBIR solicitation topic, MSR worked with the Army team at the Natick Labs in Massachusetts to develop and propose an "ultra-filtration" individual water treatment device (IWTD).

Utilizing best-in-class hollow fiber technology, their IWTD came to be part of an integrated drinking system. Water taken directly from local sources is placed in a bladder with an attached drinking tube. The IWTD is then spliced into the tube so the user can drink directly from the bladder, pulling water through the purifier.

A military focus group was established so user feedback could be incorporated into the development process. Pacuska said, "We were able to make sure that all of the requirements, those needs that soldiers have, were captured within that program, so that the final product has a high level of survivability and soldier acceptability."

Pacuska added that "we can test things in the mountains, we can test things in airplanes. We can go wherever we need to ensure that the item is going to meet those soldier-capability needs." Field testing for the MSR IWTD was extensive, and lasted for several iterations over many years. Full scale evaluations were ultimately performed at the Army's Jungle Operations Training program in Hawaii, resulting in high-profile field trials. The relationship enabled Natick Labs to push MSR to achieve mil-spec requirements for ultra-filtration. This had never been accomplished before.

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In the end, two different products were designed—one for the military and another for the outdoor market. As of 2018, all U.S. Army foot soldiers (forward deployed infantry) have been outfitted with the IWTD. The device provides soldiers with the safety and security of knowing that they can meet their own water requirements, greatly increasing their chances of success and survival in challenging and worst-case scenarios. According to Army Captain Kristopher Hartwell, the new IWTD also offers new flexibility for mission commanders. Now, Hartwell said, mission commanders "can consider using indigenous water supplies of unknown qualities, to filter and drink water where they weren't capable of doing that before. The IWTD creates much-needed flexibility in a commander's logistical support planning."

The Individual Water Treatment Device has been declared a unilateral success. As a result, a Warfighter on the battlefield in Afghanistan and a hiker on the Pacific Crest Trail can now both quickly and easily access safe, clean, potable water.

Cascade Designs

Modernization Priority: General Warfighting Requirements (GWR)

Seattle, WA • SBIR contract: W911QY-11-C-0004 • Agency: Army • Topic: A09-161, Modular In-Line Water Purifier for MOLLE Hydration Systems