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U.S. Army samples ocean floor for HUMMA project

ECBC partners with University of Hawaii to monitor sea-disposed WWII munitions

ABERDEEN PROVING GROUND, Md. – Five miles off the southern coast of Oahu, Hawaii, a three-person submersible was lifted off the back of a boat by a mechanical crane. Two scientists from the U.S. Army Edgewood Chemical Biological Center (ECBC) prepared for a 550-meter descent to the bottom of the ocean where WWII-era chemical warfare munitions were found.

One of those researchers was Mike Knudsen, the field remediation air monitoring manager for the Chemical Biological Application and Risk Reduction (CBARR) Business Unit of ECBC. Knudsen was part of a CBARR team that supported a multi-phase research effort called the Hawaii Undersea Military Munitions Assessment (HUMMA) to investigate sea-disposed military munitions along the Hawaiian coast.

“A typical dive is between eight and nine hours in a small metal sphere that is seven feet in diameter, and there are three people in there,” Knudsen said. “It was a small, cold space. But an absolute, can’t-pass-up-opportunity. I was excited.”

According to the HUMMA project website, both conventional and chemical munitions were discarded south of Pearl Harbor following World War II, including 16,000 M47A2 100-pound mustard-filled bombs. For two weeks beginning on Nov. 23, CBARR supported its second mission for HUMMA, and provided chemical analysis for nearly 300 samples collected by the submersible, including 165 sediment samples, five water samples and 36 samples of shrimp tissue.

“Our job on the dive was to provide chemical warfare material sampling expertise and to help locate items on the bottom of the ocean. One of the big pieces of the job was to watch the sonar to make sure the sub doesn’t run into things or get snagged on other hazards,” said Knudsen, who has made a total of six dives down in the submarine.

John Schwarz, CBARR analytical chemistry laboratory manager and project lead, took the equivalent of a mobile analytic platform and stationed it on a boat in order to analyze the collected samples. A glove box was used for sample preparation and MINICAMS accurately monitored air inside the designated laboratory space. All equipment in the designated onboard laboratory, including computer monitors, had to be tied down due to the ship’s movement on the ocean surface. Schwarz said the experience was more unique than anything else he’s done for CBARR.

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“On the ship we were able to successfully execute the quality of analytical procedures and protocols for samples as we would in our fixed laboratory back at our headquarters at the Aberdeen Proving Ground in Maryland,” Schwarz said. “To me that’s why it was a big achievement. We did it on a boat in the ocean.”

According to Schwarz, the munitions themselves are too dangerous to lift from the ocean floor and are unlikely to wash ashore due to the depth of their location, where the water temperature hovers around the 40 degree Fahrenheit mark. The possible chemical agent inside the WWI-era weapons would be frozen at that temperature. But there was one thing that was curious about the munitions, Schwarz said. They were home to an increased population of Hawaiian Brisingid sea stars that made the deteriorating munitions a natural habitat. During HUMMA, a few sea stars were collected and sent to Smithsonian scientists to study.

CBARR was first brought onto the research team as chemical experts in 2009; two years after the HUMMA project began. The research effort is funded by the U.S. Army and led by the University of Hawaii to investigate the environmental impact of the sea dumped munitions on the surrounding environment. During that time, prime contractor, Environet, and the University of Hawaii mapped the ocean floor and used the PISCES submersible to collect samples within 10 feet of munitions.

The Army and UH are finalizing the research report for their latest mission. The next phase of the project will evaluate performance differences between human-occupied submersibles and remotely operated vehicles, and also test new sensors and instruments that will improve the visual mapping and sampling of the munitions.

Photo captions:
IMG_01: *Crew members wait to dock the PISCES submersible on the deck of the boat. The three-person underwater vehicle has three view portholes, robotic arms and crates to collect various samples from the ocean floor. Credit: Environet.*
IMG_02: *ECBC scientist Mike Knudsen, air monitoring manager for CBARR, boards the PISCES submersible before a nine-hour dive. The vehicle was operated by a pilot from the Hawaii Undersea Research Laboratory. Credit: Environet.*
IMG_03: A Brisingid sea star hovers near the ocean floor where scientists have discovered its natural habitat near old WWII-era chemical warfare munitions. Credit: Hawaii Undersea Research Laboratory.
IMG_04: *The underwater vehicle prepares for its 30-minute dive nearly 550 meters below the water’s surface to collect sediment, water and shrimp samples. Credit: Environet.*

For more information about ECBC, visit http://www.ecbc.army.mil/.

ECBC is the Army’s principal research and development center for chemical and biological defense technology, engineering and field operations. ECBC has achieved major technological advances for the warfighter and for our national defense, with a long and distinguished history of providing the Armed Forces with quality systems and outstanding customer service. ECBC is a U.S. Army Research, Development and Engineering Command laboratory located at the Edgewood Area of Aberdeen Proving Ground, Maryland. For more information about the Edgewood Chemical Biological Center, please visit our website at http://www.ecbc.army.mil or call (410) 436-7118.

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