

ENVIRONMENTAL UPDATE

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Neal Snyder

A researcher moves an autonomous robot to a starting point on McGregor Range, N.M., part of Fort Bliss.

Robots Remove Unexploded Ordnance for New Range Construction

Environmental Command leads technology demonstration at Fort Bliss.

By Stephen Baack

Fort Bliss Monitor

A variety of robotic technologies detected and removed unexploded ordnance from training ranges at Fort Bliss, Texas, during a demonstration sponsored by the U.S. Army Environmental Command early this year.

The demonstration was part of the Army's effort to find technologies to make new range construction safer, quicker and less costly. Base Realignment and Closure, Army growth and transformation are pushing range modernization to the top of the priority list at many installations.

Leaders from the Pentagon, USAEC, the Aberdeen Test Center, the Air Force Research Laboratory (AFRL) and the U.S. Army Corps of Engineers observed the robots in action in February, near the end of the project.

The trial focused on pinpointing ways to detect and remove unexploded ordnance – a task more important than ever as the range modernization program expands, said Plyler McManus, chief of the Military Munitions Design Center for the Corps of Engineers.

"Prior to 9/11, we had two ranges in the range program," McManus said. "After 9/11, we've got hundreds. ... Before, when we were only building two ranges a year, the problem wasn't that large. Now that we're currently working on 300 ranges, the problem becomes much more obvious."

On Fort Bliss, researchers evaluated two basic robotics systems developed by the ARFL: the All-Purpose Remote Transport System, and the Automated Ordnance Excavator. Both operate via remote control using attachments to remove brush or sift dirt for ordnance, according to Gene Fabian, Range Sustainment Program manager for the U.S. Army Aberdeen Test Center. An operator guides them via joystick and camera from a safe distance.

A third unit on hand, the Advanced Mobility Research and Development System, works autonomously, guiding itself to cover territory within given boundaries, Fabian said.

Fabian said its general pattern is very similar to that of a smoothing machine on an ice rink. "We typically use that Zamboni® pattern to make sure we get complete coverage," said Fabian. "And the data for our geophysical detection devices is very clean because it's very precise, fast: it tells you where to go. It doesn't waddle and wander all over the site like a human being would, so we actually get much better data quality by using the robotic system."

The demonstration served two purposes, according to Kimberly Watts, Range Technology Program manager for USAEC. First, the researchers wanted to ensure the equipment worked as expected. It did, said Watts, especially for smaller areas. Second, program officials wanted to reintroduce Army leaders to the potentials of the technology.

Key decision makers, such as Tad Davis, deputy assistant secretary of the Army for Environment, Safety and Occupational Health and officials from the Department of the Army G3/5/7, were the demonstration's intended audience, McManus said. "One of the reasons we're here today is to communicate to them what we're doing so they can assist us, and we can assist them."

Attendees also included members of agencies involved in one way or another in finding and removing unexploded ordnance, according to Col. Maria Gervais, commander of USAEC.

"We bring all these key stakeholders in the same place, show them the technology, demonstrate that the technology can work, figure out what it is we need to do to make the technology better and then from there we're determining the way ahead, so we can take it from just a technology demonstration to actually taking this to being part of the solution," Gervais said.

McManus said the group visited Fort Bliss because its ranges are the site of a hefty amount of construction due to the Base Realignment and Closure and Grow the Army initiatives. Fort Benning, Ga., he said, is the only other installation in the country seeing that kind of growth.

The group visited a digital multipurpose range complex (DMPRC) under construction.

"We've got a big range that has to have ordnance clearance on it," said McManus. "We severed off a little piece of it. We said, 'Let's take these advanced tools and let's clear this severed-off piece and see how well that works.' And if it works, we'll take it elsewhere.

"We pulled all the experts in the field that we could get access to, we compiled all the good ideas we could get from all the experts, we took those ideas in brainstorming mode, vetted those ideas and we selected those we thought had merit," McManus added. "We're demonstrating those here."

These advanced tools, like remote-controlled sifters and shovels, have been operating at the DMPRC for about a month and wrapped up their work a few days after the visit.

That visit is the result – though not the end goal – of five years searching for technological solutions that would make the UXO mitigation process more cost-effective, safer and on schedule, and forming partnerships – like that with AFRL and their modified equipment, said Gervais.

"We used to have to spend a lot of money to survey the area, and then spend a lot of money to go in and clear the area," Gervais said, and added that that was when G-3/5/7 approached USAEC to lead the charge in finding those solutions.

"So it's just taken five years to finally get to a point where the technology has matured enough that we could come and demonstrate it now," she said. "It's proven to be effective. We just need to work on a few things so it will be much more effective on a larger scale."

The Army is dealing with impact areas much differently today, Gervais said. Yesterday's approach was an understanding that areas saturated with UXO would no longer be used.

"But because of all these BRAC and Grow the Army initiatives and transformation efforts that are ongoing, space on the installation is at a premium," she said. "What has happened is we've had to go back, and we have to reuse some of this land that we were not planning on reusing previously."

Speed is critical for the U.S. Army, which currently has many areas in need of surveying and a limited supply of UXO technicians. They're looking at robotic removal options to make a big difference as they clear and maintain range sites, Fabian said.

But speed isn't the only factor – safety is paramount, and costs are also expected to be lower with the robotic technologies, according to Watts. They're currently using off-the-shelf technologies fitted with the robotics package. Combine that with the time savings and increased safety, and robotics UXO removal could potentially benefit the Army's Range Modernization Program as well as Army cleanup, Watts said.

In the past, if the Army needed to reuse land, the only practical way to uncover UXO was sending people on foot to find it.

"That's dangerous, that's labor-intensive, and this technology right here allows the same thing to be achieved much safer, much quicker and at a reduced cost," said Gervais.

New survey and mapping techniques are also coming into play, she added. Although many of the new tools are designed to make UXO removal safer, Gervais said sometimes it may be smarter to simply move the mapped range – which they did with the DMPRC. After determining UXO density of the range, USAEC and Corps of Engineers officials decided to recommend shifting the range by 7 degrees.

According to Watts, the survey cost \$55,000, but by moving the range to the north, they helped the Army avoid a cost of about \$500,000 – the cost of UXO mitigation.

"It's a 9-to-1 return on investment," Watts said.

"Because of that, we were able to meet the mission, keep the range project on schedule, and we didn't have to mitigate the UXO impact, which drove down the cost and also helped the overall construction project remain on track," said Gervais. The next step, Gervais said, is convincing more Army officials that the technology can mature into meeting the Army's requirement on a grander scale.

"We have to take the business case proposal to the Army, and we have to get the Army to say, 'Yes. This is what we want to do,'" she said. "Because with that we'll get the endorsement that we need and with that will come the funding and the resources."

Note: Lindy Kyzer, U.S. Army Public Affairs, and Neal Snyder, U.S. Army Environmental Command, contributed to this article.

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