Months of Creative Problem Solving Lead to Alaska Missile Test

Chuck Wullenjohn

The Army's Cold Regions Test Center (CRTC) is located in the heart of Alaska's largely unspoiled interior, a rugged land of wild river valleys, stark glaciers, and herds of animals that have made this region their home for thousands of years. Ferocious winter temperatures plunge to well below zero, weather conditions capable of wreaking havoc on unprepared Soldiers, military vehicles, and weapon systems. The CRTC's mission is to thoroughly test military equipment to meet this critical challenge.

A bulldozer, frozen from overnight temperatures hovering around 50 below zero, is ready to operate after the engine warms and lubricants begin to flow. Extreme cold can wreak havoc on equipment that has not been winterized. (U.S. Army photo by Chuck Wullenjohn.)

This past winter, the 50-member CRTC workforce devoted months preparing for the test firing of the Non-Line-of-Sight-Launch System (NLOS-LS), a weapon system under development that offers significant battlefield capabilities to American forces. Reinforced by specialized crews flown in from Arizona's Yuma Proving Ground (YPG) and Alabama's Redstone Technical Test Center, the effort involved innovation and creative problem solving, resulting in unique solutions to daunting challenges.

"The creativity exhibited by the workforce and the vast amount of work they performed gave me a greater sense of pride than almost anything else I witnessed since assuming command," remarked LTC Vincent Malone, CRTC Commander.

Test Preparation Begins

Preparation began in July 2008, coordinated by test director John Viggato, who immediately flew to White Sands Missile Range, NM, where the NLOS-LS was already being tested, to develop expertise on the system. A 5-year CRTC veteran, Viggato had worked on an exceptionally wide variety of test programs over the years, making him an ideal test director. In short order, he identified numerous major challenges. The first, and most obvious, was that a huge safety zone extending over many miles of wilderness would be required. Since extreme cold is known to cause problems to systems, in sometimes unforeseen ways, the safety zone would ensure safety to the public.

The test plan called for the missile impact area to be located far downrange, about 50 miles from the nearest paved road, so a temporary infrastructure of roads, power, communications, and support facilities would have to be created for observers, data collection devices, and much more. Target vehicles would have to be transported from the lower 48 states, and then driven across the treacherous Delta River. With no permanent bridge, a safe, reliable solution would have to be developed.

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With testing challenges on his mind, Viggato set to work. He participated in several flyovers of the area in late summer and fall, developing a lay of the land and identifying areas for facilities that needed to be established. The land consisted of largely pristine forested wilderness, with large areas of tundra and brush that came alive with dense clouds of ravenous mosquitoes during the relatively brief Alaska summer. He and others forded the Delta River, traveling 26 kilometers to an observation post built by the U.S. Air Force (USAF), a trip taking 5 hours in each direction.

As winter came, temperatures plunged well below freezing and the Delta River froze. Viggato huddled with others to consider a range of options before settling on a solution regarding the untamed Delta—they would build a 1-mile-long ice bridge over the watercourse to solve the transportation dilemma. He handed the task to test officer Dave Hoffman, who boasted long test program experience and is an expert on winter survival, but who had never built an ice bridge. With a smile, Hoffman accepted the challenge and set to work. He learned fast, for construction began in November.

The Ice Bridge

"We provided Dave Hoffman a starting point by handing him a copy of a 1964 Army technical manual about ice bridges," said Viggato with a laugh. "What he accomplished after that was fantastic."

Within weeks, Hoffman and his 3-person team had completed an informal crash course on ice bridge design. They searched Internet sites, plowed through technical manuals and other written documents, and consulted with USAF personnel who had experience building ice bridges in Alaska.

"I wouldn't say I became an ice bridge expert, but I sure learned lots," Hoffman said. An ice bridge, he explained, consists basically of frozen water over a

Dave Sutherland, of CRTC's maintenance shop, makes final alterations to a piece of metalwork he is fabricating for skids used to haul cargo containers behind tractors downrange. (U.S. Army photo by Chuck Wullenjohn.)

riverbed. In the case of the one he designed over the Delta River, the bridge was 70 feet wide and 1 mile long. The road surface was about 12 inches above the river surface. Permanent inspection sites were built along the bridge about every 50 yards to monitor water flow beneath.

The Delta River is a "braided" river, meaning the watercourse divides into several main channels and a number of minor tributaries, with islands between. The exact number of channels varies from year to year. The river has a generally gravel bottom and is fed by glacial streams from nearby mountains, along with rain and groundwater. Though everyone at CRTC referred to it as an ice bridge, and dubbed Hoffman with the moniker "bridge troll," it would more properly be called a combination ice bridge and ice road.

Hoffman says construction was marred by a few accidents, such as a bulldozer crashing through ice in the early weeks, but nothing beyond what was expected. Once the bridge was built, however, it required constant maintenance and Hoffman made a point of inspecting it each day.

The test center's standard operating procedure was for Hoffman to cross the bridge before anyone went across. This policy ensured the maintenance of accountability for everyone using the bridge and allowed him to keep a watchful eye for anything amiss.

"The biggest problem was overflow caused by ice dams upstream that broke and sent torrents of water above and below the bridge," he said. "We sometimes saw 3 feet of water flowing over." After these flows subsided, several inches of new ice would form atop the bridge that had to be groomed. The overflows occurred regularly throughout the winter, occurring several times each month.

A huge truck, traveling to the test site, is carefully maneuvered across the ice bridge over the frozen Delta River. (U.S. Army photo by Mike Kingston.)

By the time January 2009 rolled around, the outside temperature had grown even colder, plunging to a mind-numbing 50 below zero. The river had frozen to a depth of about 55 inches by this time.

The success of the ice bridge proved crucial, for nearly all personnel, supplies, and equipment moved across it. "Without the bridge, we wouldn't have been able to make it out to the area where the test was to be conducted," said Hoffman. "Success hinged on this bridge."

Logistics Prove No Mean Feat

Real-world targets were needed for the missiles and they were located at YPG, where a fleet of more than 100 former Soviet vehicles, both track and wheeled, are maintained for just this sort of project. Two T-72 main battle tanks and four BMPs (Soviet tracked armored vehicles), all operational, were readied and sent on their way, a process that involved a complex itinerary and was an interesting travel feat on its own.

The vehicles traveled by trailer to Seattle, WA, where they were loaded aboard a barge for movement to Alaska. Once offloaded in Anchorage, they were secured aboard railcars bound for Fairbanks, a 360-mile trip, in the state's interior. Once there, crews from YPG met them, transferred each to a trailer for the several hour journey to CRTC, then drove them 50 miles downrange to the target area, crossing the ice bridge on the way.

CRTC planners opened and manned an operations center at Observation Post 26, a USAF facility located atop a remote downrange ridge. Crews of two to four employees at a time stayed overnight at the post, often for stretches lasting four nights. Bunks and a kitchen were located inside the heated building, as was a mission control room featuring several large screens on the wall for video feeds. A wireless communication system was established to allow the actual missile firing to be controlled from within the control room.

Extreme cold weather is dangerously unforgiving to the unprepared, and workers had to be ready for any eventuality. Observation post personnel were outfitted with full arctic survival gear in

case power failed or any other calamity occurred. Although everyone kept an eye on each other and maintained radio communication while outside, significant emergency help would take time to arrive.

Solutions Developed

"The CRTC workforce always goes the extra mile to ensure good mission results, and we really saw it in this case," said Viggato. "People put in long hours and performed tasks well beyond their normal jobs."

CRTC's Allied Trades machine shop, for example, solved the problem of transporting heavy warm-up shelters constructed from large metal transportation containers by fabricating skids, enabling them to be towed through snow and ice. They also constructed a portable cold chamber from 4-inch extruded foam insulation, fastened together with fabric hook and loop (Velcro) straps, to condition the missiles to specific cold temperatures if the weather warmed before firing.

"Warm-up shelters may not sound as important as they are, but when you're working outside in temperatures hovering far below zero, these shelters can be lifesaving," said Malone. "Getting out of the elements for 10 or 15 minutes to warm up and enjoy a few creature comforts can make a world of difference." Each shelter was equipped with a generator for electrical power.

A situation involving CRTC's M88 recovery vehicle, the only such vehicle within the state of Alaska, was overcome through close cooperation between CRTC and its higher headquarters at YPG. "For the test, this vehicle was vital," said Malone, "for each target vehicle had to be recovered and returned." The problem was that the M88 had experienced a recurring mechanical problem for years that caused fuel oil smoke to billow up in clouds. Though mechanics had fussed over it while making repairs, they expressed concern that the M88 would be unable to operate at full power. "And we definitely didn't want it to break down 40 or 50 miles from the nearest road," Malone added.

Mechanics at YPG were contacted. They traveled to CRTC to remove the M88's power pack, correct the problem, and get it back on the road. But there was one more thing. "The property book folks arranged for us to exchange our M88 for a newly reconditioned one and then get an additional M88 sometime in the near future," said Malone with a smile. "YPG really went out of its way for us."

CRTC workers carefully mark the sides of the ice bridge to prevent drivers from mistakenly venturing off the carefully prepared bridge surface. (U.S. Army photo by Mike Kingston.)

One thing that sets CRTC apart from other installations is its tight-knit workforce that sees employees cross-trained in areas other than their specialty. According to technical director Jeff Lipscomb, the CRTC workforce is small and everyone is multifunctional. "We hire specialists for our jobs, just like other installations, but 'other duties as assigned' really means that here," said Lipscomb. When he hires new employees, he makes a point of telling them that there is one thing he won't accept hearing twice from the same person: that something is "not my job."

Test Results

Despite the hard work over many months, the test was postponed shortly before the missiles were scheduled to fire because of system integration problems. Software upgrades and other issues arose that forced the firing date to slip back, to the point where CRTC's coldest weather had passed.

The effort was far from in vain, however, as Viggato pointed out. "The program manager has committed to return next winter," he said. "The test will be identical and we know the full scope of what needs to be done. This year's experience will definitely make it run smoothly."

And what of the ice bridge that melted away when summer approached? "It's all part of the cycle of life," mused Hoffman in a soft voice. "The ice bridge is like everything else—you give birth to it but, eventually, it dies. The bridge will be back next year."

One change is probable, though. Army engineer troops from Fort Richardson, AK, are considering taking on the mission of creating and maintaining the bridge throughout the upcoming test effort, which will provide excellent real-world training. "They appear excited at the opportunity," remarked Viggato.

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