

SUCCESS STORY

# Unique Writing Tool Enables Combat Troops to Communicate in the Dark



## CRAYTAC IR-LOW-LIGHT/ NO-LIGHT COMMUNICATION USING IR MARKINGS

CONTRACT NUMBER: FA8650-19-C-5082

SBIR COMPANY NAME: Battle Sight Technologies and Cornerstone Research Group, both of Dayton, Ohio

TECHNICAL PROJECT OFFICE: AFRL/RXAS

PUBLISHED: February 2021

### THE BASICS

- Special crayon dubbed "CrayTac"
- Allows troops to write messages or draw complex figures on walls, sidewalks and other surface
- Only visible to someone wearing night-vision goggles
- Can use to mark vehicles and other equipment to ID in low- or no-light situations
- Can use as glow stick to mark room as cleared
- Original technology developed by Dr. Larry Brott and other scientists at the Air Force Research Laboratory
- Potential cost savings of 94% over typical infrared chemical lights
- \$1.5 million Phase II Air Force SBIR/STTR contract in 2019
- Funding allowed progression from making by hand to developing the ability to produce hundreds in an hour

### BATTLE SIGHT TECHNOLOGIES LLC, A VETERAN-OWNED SMALL BUSINESS, IS SCALING UP PRODUCTION OF A UNIQUE WRITING TOOL THAT ENABLES COMBAT TROOPS AND OTHERS TO COMMUNICATE IN THE DARK.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer program, Battle Sight has used licensed military technology to create a special crayon for warfighters, first responders and disaster-relief workers.

Dubbed CrayTac, this device allows troops to write messages or draw complex figures on walls, sidewalks and other surfaces.

The markings are only visible to someone wearing night-vision goggles. Troops can use CrayTac to mark vehicles and other equipment so they can be identified in low- or no-light situations. It also can be used in place of a glow stick to mark a room as cleared.

The company spent the last couple years fine-tuning CrayTac and field testing it through Air Force SBIR-supported events such as Tech Warrior OPS.

However, to achieve Battle Sight's longer-term goal of selling more CrayTacs, it needed more manufacturing capacity. This prompted the company to team with Cornerstone Research Group, also based in Dayton, Ohio.

The collaboration ultimately resulted in Battle Sight gaining enough production capacity to shift from building CrayTacs by hand to making them in large batches. This marks a critical step toward growing future sales and employment.

### BEHIND THE TECHNOLOGY

The original technology undergirding CrayTac was developed by Dr. Larry Brott and other scientists at the Air Force Research Laboratory. In 2018, Battle Sight licensed the technology from Brott and his co-inventors. Since then, the company led by Nick Ripplinger, president, and Bennett Tanton, vice president, has worked to commercialize the technology.

CrayTac consists of microencapsulated chemicals encased in wax and shaped into a cylinder. The crayon is housed in a protective grip tipped on one end with a height-adjustment knob, similar to a lip balm tube.

The pressure exerted during writing breaks open the tiny chemical capsules and leaves behind markings. The words and markings made with the crayon are visible to those using night-vision goggles and other technologies.

Writings produced with CrayTac remain invisible to the naked eye. For those aided by night-vision goggles or other technology, messages scribbled with the product appear in glowing green letters. Battle Sight's product allows troops in the field to mark or leave messages on walls, sidewalks, and other surfaces for their comrades.

The military typically has used infrared chemical lights for such tasks. But, whereas glow sticks can be expensive, CrayTac could slash costs 94 percent for military buyers, Ripplinger said.

*continued*

continued from page 1

The infrared chemical lights currently used by the armed forces cost \$1.72 each, or \$1,720 per 1,000 units, said Ripplinger, a former Army soldier. To get the same number of uses from the CrayTacs, it would only cost \$70—a \$1,650 savings, he said.

The potential cost savings from CrayTac makes the project valuable to the Air Force, said 1st Lt. Lawrence Romett of the Air Force Research Laboratory's Materials and Manufacturing Directorate.

Additionally, CrayTac would expand warfighters' capabilities because they can carry a single CrayTac unit and get roughly 1,000 uses from it, instead of needing to carry multiple single-use glow sticks, Romett said.

Cost savings aside, CrayTac also offers other benefits such as lighter weight, less waste, and fast, easy use.

Thanks to its improved manufacturing process, Battle Sight has made more than 1,000 of its signaling crayons, most of which were shared with potential end users and buyers.

First, the team focused on scaling up the processing of individual components used to make the crayons.

Kristin Cable of Cornerstone Research Group (CRG) said improvements to Battle Sight's manufacturing included formulation changes as well as novel process development, all of which allowed CrayTacs to be produced at greater scale.

"All members of the team worked in parallel and collaboratively to solve the issues," she said. "Each company brought solutions vital to the overall success of the program."

Most of CrayTac's components are available in bulk. However, the product requires a custom microcapsule to contain the luminescent chemical mix until pressure from writing breaks the capsules open.

### SBIR FUNDING WAS CRITICAL

In 2019, the Air Force SBIR program awarded a \$1.5 million Phase II contract for this project.

The funding has allowed Battle Sight and CRG to progress from making CrayTacs by hand to developing the ability to produce hundreds in an hour.

In addition, the SBIR funds also supported efforts to make the CrayTac's markings last longer, a key success metric for the program. The team also developed standardized procedures and quality-control tests for making CrayTacs.

Executives say sales will grow to \$2.5 million within a year of fully establishing the manufacturing process. 

### SIGNIFICANT SAVINGS FOR THE U.S. AIR FORCE

CURRENT COST

**\$1,720**

PER 1,000 UNITS

PROJECTED COST

**\$70**

PER 1,000 UNITS

PROJECTED SAVINGS

**\$1,650**

PER 1,000 UNITS

**94%**

REDUCTION IN COST