SBIR TRANSITION

SUCCESS STORY

SBIR INVESTMENT:	SBIR TOPIC NUMBER:	PHASE III FUNDING:
$3.8M	HR001121S0007-31	$9.4M

THE CHALLENGE

Modern military operations require robust infrastructure that can support rapid deployment and maneuverability across various terrains. Semiaquatic environments, including beaches and wetlands, pose a significant challenge for amphibious landing zones, airfields, and temporary roadways. Traditional stabilization methods, such as cement and chemical-based solutions, are often expensive, environmentally hazardous, and difficult to implement in coastal and aquatic conditions. To address this, DARPA sought an innovative, sustainable, and field-deployable solution to strengthen sand and soil while maintaining much of its original permeability and environmental integrity.

TECHNOLOGY | TRANSITION

Through its Small Business Innovation Research (SBIR) program, DARPA invested in advancing BioSqueeze, Inc.'s biomineralization process, known as Microbially Induced Calcium Carbonate Precipitation (MICP). Using native soil and water combined with bacteria solutions and biomineralization fluids, MICP creates resilient, erosion-resistant surfaces that cut costs, boost efficiency, and offer an eco-friendly alternative for soil stabilization. DARPA's investment enabled full-scale testing and demonstrated the technology's potential to deliver durable substrates (long-lasting materials support) for pavements, roadways, and airstrips.

In April 2025, DARPA successfully demonstrated BioSqueeze, Inc.'s biomineralization technology at Camp Lejeune. During the demo, BioSqueeze, Inc. hardened a 70' x 35' beach area to over 17 inches deep, enabling it to withstand 800+ military vehicle passes with minimal rutting. Analysis by the U.S. Army Corps of Engineers' Engineer Research and Development Center (ERDC) confirmed the technology exceeded expectations, noting that with further refinement, it meets the criteria for contingency operation scenarios.

The demonstration validated BioSqueeze, Inc.'s MICP process for military mobility and expeditionary infrastructure. As a result, BioSqueeze, Inc. secured two Air Force Phase II SBIR awards for airfield crater repair and subgrade stabilization, highlighting its dual-use potential and accelerating adoption across defense and commercial markets.

BioSqueeze, Inc. was one of the first participants in the DARPA SBIR XL pilot program, an initiative designed to accelerate transition and commercialization for small businesses. SBIR XL offers larger award ceilings, streamlined proposals, and greater flexibility for DARPA Program Managers, and bridges the gap between early-stage research and Department of War (DoW) acquisition. Through this support, BioSqueeze, Inc. has refined its technology and forged connections with key defense stakeholders, including the Office of Naval Research (ONR), the Marine Corps, and the Air Force Research Lab (AFRL).

BENEFIT TO NATIONAL SECURITY

The successful implementation of BioSqueeze, Inc.'s MICP technology gives the U.S. military a revolutionary tool for terrain stabilization.

- **Enhanced Mobility**: Strengthens beachheads and shorelines for improved vehicle and personnel deployment
- **Cost-Effective Solutions**: Reduces reliance on traditional cement-based stabilization and cuts logistical costs and environmental impact
- **Rapid Deployment**: Within days, stabilizes surfaces using local soil and water resources and enables quick and flexible response in dynamic operational environments
- **Environmental Compatibility**: Unlike conventional chemical stabilizers, biomineralization maintains much of its natural permeability and minimizes disruption to local ecosystems

These capabilities support critical military infrastructure needs, including airfield aprons, landing strips, and road networks in austere and remote environments.

ABOUT BIOSQUEEZE, INC.

BioSqueeze, Inc. has transformed from a pioneering startup in Montana to an industry leader in biomineralization, achieving dual-use technological excellence across both energy and defense sectors.

Developed over a decade with support from the Department of Energy and Montana State University, BioSqueeze, Inc.'s biomineralization technology originally tackled methane leaks in oil and gas wells by sealing leakage pathways in cement. Due to its robustness and adaptability, the same technology has been validated in field settings for military-relevant applications, making it a dual-use innovation bridging commercial and defense needs.

Since partnering with DARPA through the SBIR program, BioSqueeze, Inc. has grown its team from four founders to 40 employees. The company also secured $9.4M in Series A funding, led by an investment from Next Frontier Capital, to further develop its technology and expand its operations across the United States and three Canadian provinces.

FUTURE

Looking ahead, BioSqueeze, Inc. is poised to expand into large-scale military construction. The company will work closely with key DoW research, development, test, and evaluation (RDT&E) organizations such as AFRL, ERDC, and the Air Force Civil Engineering Center, as well as end users, to apply its technology in disaster response and erosion control. BioSqueeze, Inc. was also selected in July 2025 for a Tactical Funding Increase (TACFI) award of $2M from AFWERX for continued development of its products.

On the commercial side, strategic partnerships with construction firms will help modernize roadbed stabilization. With support from the Office of the Under Secretary of War for Research & Engineering and the Army Research Lab, BioSqueeze, Inc. is positioning itself as a leading innovator at the intersection of defense and infrastructure.

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