

WHO

SYSCOM: NAVSEA

Sponsoring Program: Operational Logistics (OPLOG) Program

Transition Target: Navy T-AKE, T-AO, and T-AOE ships that complete Connected Underway Replenishment (CONREP) missions

TPOC: (202) 781-1996

Other Transition Opportunities: Landing Craft Utility (LCU), Floating production storage and offloading (FPSO) units transfer oil to transport ships, with over 270 units in use worldwide, Emergency cable cutter for general offshore use (mooring/anchor lines, tow cables, etc.)

Notes: The US Navy currently has 33 non-commissioned T-AKE, T-AO and T-AEO ships. At an average of 8 cutting devices per ship, the initial transition target consists of two to three hundred units. While PSI is developing the technology specifically for the Navy's needs, PSI is seeking commercial applications in oil and gas to increase sales volume and further reduce the unit cost for the Navy.



<https://www.navy.mil/Resources/Photo-Gallery/igphoto/2003276336/>

WHAT

**Operational Need and Improvement:** During Connected Underway Replenishment (CONREP) operations, Navy Combat Logistics Force (CLF) ships connect to the receiving ship with a 1-inch wire rope highline at each solid cargo transfer station. The ship's crew needs the ability to cut the highline quickly in the event of an emergency to prevent damage to equipment or injury to personnel. The current emergency wire rope cutter uses explosive cartridges to drive the cutting blade through the wire rope. The Navy has not purchased any cartridges since 1989. While there are several thousand cartridges in inventory, no future acquisition of these explosive cartridges is planned. Commercial non-explosive metal cutters are too slow or large and expensive to serve in this emergency capacity.

**Specifications Required:** The system must be person-portable, with minimum acquisition and integration costs of no more than \$10,000 to \$20,000 per CONREP Station. The cutter must be able to sever a 1-inch (minimum) wire rope or cable and be able to reliably cut 50 ropes without a failure. Additionally, the system must be able to operate at temperatures from -20 F to 125 F in marine environments.

**Technology Developed:** The Hydraulic Pneumatic Hybrid Emergency (HyPHE) wire rope cutter is a person-portable device that severs a 1-inch steel cable in less than two seconds. The design is structurally optimized for weight and ergonomics to allow the user to reach cables up to 10-feet above the deck. It is powered by refillable pneumatic cartridges that are safe and easy to transport and store.

**Warfighter Value:** The HyPHE wire rope cutter will increase CONREP mission safety and reliability compared to the existing explosively-actuated cutters. The technology will also eliminate the special handling and storage procedures required for the current cartridges as well as the need to assess and manage the fitness of the cartridges currently in inventory.

WHEN

Contract Number: N68335-21-C-0247

Ending on: Jun 30, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Benchtop prototype cutting performance demonstrated	N/A	Bench mounted prototype successfully cut 1-inch steel cable in less than two seconds using stored pneumatic supply	4	3rd QTR FY20
Person-portable prototype cutting performance demonstrated	N/A	Person-portable prototype severed 1-inch cable in less than two seconds and completed fifty consecutive cuts without significant wear	5	3rd QTR FY22
If Phase II Option II exercised, cutting performance, durability and environmental resistance demonstrated	Low	PSI will deliver at least five prototypes that can sever a 1-inch cable in less than 3 seconds, and are operable after shock/vibration, temperature, salt fog, sand, rain, humidity, solar radiation, and contamination by fluids per MIL-STD-810H	6	1st QTR FY25

HOW

**Projected Business Model:** The HyPHE is a standalone device that will be fielded on Navy T-AKE, T-AO, and T-AOE ships. PSI has the capacity to assemble up to 200 units per year for a period of three years when the product initially launches. PSI will identify a manufacturing partner to assist in longer-term production as new ships are commissioned and the fielded units require replacement parts.

**Company Objectives:** Founded in 1973, Physical Sciences Inc. provides advanced research and design to government and commercial customers. PSI completes technology transition and product development for government and industrial customers, prototyping for commercial applications and limited production of special instruments. PSI has completed technology and product licensing with many strategic partners and has launched four spin-out companies to date.

**Potential Commercial Applications:** The largest commercial market is the oil and gas industry. The HyPHE may be used in oil and gas floating production storage and offloading (FPSO) units transfer oil to transport ships, as an emergency cable cutter for general offshore use (mooring/anchor lines, tow cables, etc.), or as a work tool for remotely operated vehicles (ROV).