



**TESTIMONY OF  
REAR ADMIRAL MICHAEL J. HAYCOCK**

**ON  
“COAST GUARD – BLUE TECHNOLOGY”**

**BEFORE THE  
HOUSE COAST GUARD & MARITIME TRANSPORTATION SUBCOMMITTEE**

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**Introduction**

Good morning Mr. Chairman and distinguished Members of the Committee. It is my pleasure to be here today to discuss the Coast Guard’s efforts to pursue technologies and solutions that have the greatest potential to enhance the service’s acquisition and mission execution.

The Coast Guard is very thankful for this Committee’s enduring support of our acquisition, construction and improvement programs, particularly in fiscal year 2018. This support is critical to the Service’s efforts to recapitalize its aging fleet of cutters, aircraft, boats and support systems, and to address a growing backlog of shore construction and facility needs. Coupled with the supplemental funding for hurricane response activities, your legislative actions have enhanced our ability to prepare for and respond to mission needs, including future disasters.

The U.S. Coast Guard is the world’s premier military, multi-mission, maritime service responsible for the safety, security and stewardship of U.S. waters and hundreds of miles seaward. At all times, a military service and branch of the U.S. Armed Forces, a federal law enforcement agency, a regulatory body, a first responder, and a member of the U.S. Intelligence Community, the Coast Guard stands the watch and serves a nation whose economic prosperity and national security are inextricably linked to broad maritime interests.

The Coast Guard’s breadth of missions, competencies, and authorities create unique research opportunities and challenges. The Coast Guard’s Research, Development, Test, and Evaluation (RDT&E) program supports research and innovation across all of our mission areas, including search and rescue, drug and migrant interdiction, oil spill and natural disaster response, commercial vessel inspections, maritime cybersecurity, and many others.

**Coast Guard Research, Development, Test, and Evaluation Program**

This year marks the RDT&E program’s 50-year anniversary. The office was established in 1968, followed by the creation of our Research and Development Center (R&D) Center in New London, CT, four years later. Since that time, the Coast Guard RDT&E program has developed an impressive resume of nearly 2000 products, from studies to prototypes, which have enhanced Coast Guard missions and informed Coast Guard leadership decision-making.

At any given time, the Coast Guard RDT&E Program is working on more than 70 projects in support of Coast Guard operators. The RDT&E program focuses on applied technologies and enhances mission execution by facilitating the transition of new or existing technologies into the service's operational forces, while also providing Coast Guard leadership with knowledge necessary for making strategic decisions. The RDT&E program includes the Coast Guard Innovation Program, developed to best harness the creativity of the Coast Guard workforce to address enterprise challenges.

## **Cooperative Research and Development**

The Coast Guard RDT&E program partners closely with Department of Homeland Security and Department of Defense research entities, national laboratories, academia, and industry to leverage vital lower Technical Readiness Level or "TRL" research. Coast Guard RDT&E recently teamed with the DHS Office of Science and Technology (DHS S&T) to form the CG/DHS S&T Innovation Center (CG-STIC). CG-STIC is focused on projects intended to rapidly move high-TRL technologies into the hands of operators.

With a finite research budget to address a broad mission spectrum, finding willing partners is especially important. Coast Guard RDT&E's list of partners and partnership agreements is wide-ranging and is perhaps best exemplified through how Coast Guard RDT&E has worked with DHS S&T Office of University Programs at institutions across the nation. These efforts include work with the University of Southern California to inform policy decisions on maritime cybersecurity, as well as the University of Alaska to identify Arctic technology priorities. Coast Guard researchers also work alongside the Bureau of Safety and Environmental Enforcement (BSSE), the Naval Research Laboratory, and the Department of Energy at our nation's only facility for maritime full-scale in-situ oil burn research, the Joint Maritime Test Facility (JMTF) in Mobile, Alabama.

While academic institutions are a vital resource for research, the Coast Guard also focuses on building partnerships with industry. Coast Guard RDT&E maintains a dozen Cooperative Research and Development Agreements (CRADAs) with industry firms. CRADAs are mutually beneficial; they provide industry direct access to understanding end-user needs, while keeping the Coast Guard abreast of the latest developments in private-sector technology. As an example, the Coast Guard collaborated with Mercury Marine to explore diesel outboard technology. The project allowed Mercury to refine their product based on real-world operations, and helped the Coast Guard explore moving toward a single-fuel surface fleet. Coast Guard RDT&E currently has active CRADAs with Lockheed Martin, Conoco Philips, and many others.

In addition, the R&D Center partners with DHS S&T to introduce technology solutions into Coast Guard operations through DHS prize competitions. Leveraging innovative approaches like the prize authority allows the Coast Guard to crowd-source good ideas from the public to help address operational challenges.

## **Transitioning Research & Development: Supporting Future Operations Today**

The Coast Guard's research project portfolio is closely tied to service mission needs. Coast Guard RDT&E uses its innovation crowdsourcing platform to collect project ideas from the entire workforce. This raw list of ideas is prioritized by program managers, operational commanders, and other subject matter experts throughout the service. Potential projects are vetted by Coast Guard senior leaders and prioritized to ensure alignment with service priorities.

RDT&E program research generally focuses on higher TRL applied research, to concentrate efforts on how to adapt proven technologies to enhance Coast Guard missions. Evaluation of high-TRL technology often includes testing commercial off-the-shelf products in actual Coast Guard operating environments.

Over the years, Coast Guard RDT&E products have provided vital support to operational commanders. In the 1970s, the program developed “oil fingerprinting” to help Captains of the Port identify oil spill responsible parties. In the 1980s, the program helped develop navigation technologies, such as differential GPS, that were crucial to modern international commerce and mariner safety.

Today, RDT&E is working on a full spectrum of unmanned and counter-unmanned systems. Current projects include various unmanned and autonomous platforms (subsurface, surface, air, and space) and their advanced sensors capabilities, as well as systems to counter threats from unmanned aerial platforms. The program has developed and tested non-lethal munitions, technology to identify hoax search and rescue callers, and continues to lead national research focusing on oil spill mitigation.

The RDT&E program is agile, and capable of responding quickly to mission need. After the recent loss of the *SS El Faro*, Coast Guard RDT&E aided the investigation by testing the flotation of survival suits similar in age and type to those carried aboard the ship. The program supported several recent project ideas, related to operator requirements identified during the active 2017 hurricane season. Responders requested evaluation of asset tracking capabilities, social media distress notifications, and other issues that arose during the storm response. RDT&E work is now underway in these areas to help enhance first responder safety and mission performance.

The Coast Guard RDT&E program endeavors to respond to emergent needs, while also helping Coast Guard leadership position our service for the future. Coast Guard RDT&E has also begun exploring machine learning, cubesats, augmented reality, and other emergent technologies. With the help of Congress and this Subcommittee, the program is now evaluating unmanned aircraft systems, low-cost maritime domain awareness, and research important to the development of the Coast Guard’s future fleet of icebreakers.

### **Maturing the Program and Future Direction**

As the pace of cultural and technological change accelerates, so too do threats and opportunities in the maritime domain. The Coast Guard RDT&E program is increasingly vital for developing and assessing technologies and policies for future missions. The increasing intensity of natural and manmade disasters require the Coast Guard to continually find better ways to mobilize, communicate, and coordinate among responding agencies and volunteers.

Autonomous ships, and the growing operational complexity in our nation’s ports and waterways, will challenge traditional approaches to maritime governance and risk mitigation. Increasing human activity in the Arctic will likely strengthen the demand for Coast Guard presence in this extreme operating domain. Coast Guard RDT&E will continue to provide knowledge and tools to manage risk in these areas.

The Coast Guard RDT&E program faces some of the same challenges as other government agencies in attracting and retaining subject matter experts needed to understand and leverage technology in areas such as cybersecurity and artificial intelligence. Many professional scientists and engineers in government service are retirement-eligible, and the RDT&E program is exploring opportunities to better develop a pipeline of subject matter expertise able to address the research needs of the future.

## **Conclusion**

Over the last 50 years, the Coast Guard RDT&E program has helped make our nation more resilient by improving the Service's response to disasters and emerging mission demands. The Coast Guard's breadth of missions and authorities requires a robust RDT&E program to ensure we are always ready to face the threats of tomorrow.

Thank you for the opportunity to testify before you today and for your ongoing support of the women and men of the Coast Guard. I look forward to your questions.