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Summer 2010

The COAST GUARD PROCEEDINGS

Journal of Safety & Security at Sea

of the Marine Safety & Security Council

Maritime Domain Awareness

Build a Better Picture

Use the Picture Better

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Haiti Earthquake Response: *Help and Hope*

Lessons Learned *from USCG Casualty Reports*

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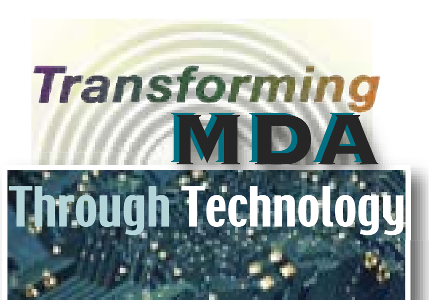

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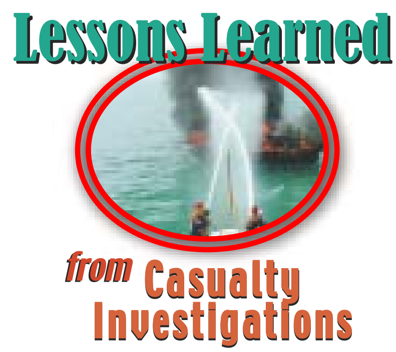

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Senior Executive's Perspective

By Mr. Dana A. Goward
Chair, National MDA Coordination Office

Do you remember the beginning of the movie "Animal House"? The film opens with a shot of Faber College. The camera pans over to a copy of Rodin's statue "The Thinker" and focuses on its base to show the college's motto: "Knowledge Is Good." That motto is a great summary of what maritime domain awareness (MDA) is all about. While MDA is many things to many people, can you imagine anyone doing anything on the water who wouldn't be better off by having an "effective understanding"[1] of what is happening around them?

Most *Proceedings* readers are concerned with maritime safety, security, and stewardship—in other words, good maritime governance. So why, specifically, is MDA important for these readers?

The first reason is that enforcement authorities—the Coast Guard and all local, state, federal, and international agencies—need to know whether laws and regulations are being followed, and, if not, how to deploy their resources to enforce them.

MDA is equally important because:

- Transparency leads to self-correcting behavior. It is a rule of human nature that people will behave better if they know there is a chance someone is watching. At the moment, most activities at sea are invisible.
- It helps level the playing field. Those who play by the rules are rewarded, and they are encouraged to identify to authorities those who are not.
- Scarce enforcement assets can be focused on response rather than patrol. Effective awareness can provide a virtual presence and deterrence at a fraction of the cost of fielding boats or enforcement personnel.

Even more importantly, MDA is the key to countering our biggest challenge—maritime criminal and terrorist networks. People-trafficking groups, drug-smuggling cartels, and terrorist cells all work to harm our nation every day. Our fundamental challenge is that they are organized as networks, and networks are incredibly effective in thwarting the efforts of hierarchies such as governments. Fortunately, governments can effectively combat networks if they also operate as networks.

Shared awareness allows the local fish and wildlife officer, the national intelligence analyst, and everyone in between to bring their own experiences, capabilities, and authorities together in a widely distributed but unified effort. When done properly, even the general public joins in a network for maritime good by identifying suspicious behavior and helping to counter illegal activity.

MDA is essential to all we do. Improving it is a shared, ongoing responsibility.

Knowledge is good. I hope you enjoy this issue of *Proceedings*.

1. "Maritime domain awareness is the effective understanding of anything in the maritime environment that could affect the safety, security, economy, or environment …" National Plan to Achieve Maritime Awareness, U.S. National Security Council, 2005.

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Champion's Point of View

By Mr. Curt Dubay
U.S. Coast Guard Director of Maritime Domain Awareness Program Integration

In Alexander Hamilton's letter of instructions to commanding officers of the U.S. Revenue Cutter Service cutters, he noted that "[t]he provisions of these sections admonish you to keep a careful eye upon the motions of coasting vessels, without, however, interrupting or embarrassing them unless where some strong ground of suspicion requires that they should be visited and examined."

This, in essence, was the birth of maritime domain awareness. For almost 220 years our cutters, aircraft, stations, boats, sensors, and people have provided the nation with maritime domain awareness. Today, as the lead federal agency for marine safety, security, and stewardship, the U.S. Coast Guard has the primary responsibility within the Department of Homeland Security to protect the U.S. maritime domain and our marine transportation system. Awareness is essential to everything we do.

Maritime domain awareness, or MDA, is the effective understanding of anything associated with the global maritime environment that could impact the security, safety, economy, or environment of the United States.

MDA requires that we **collect** and synthesize large amounts of intelligence and other information from disparate sources in a timely and comprehensive manner. We then **fuse** and **analyze** that information to convert it into actionable and reliable intelligence.

The final step is to **disseminate** this information to our federal, state, and local agency partners, and to private industry partners that require this knowledge, to ensure that our country's ports are not vulnerable to a surprise attack or disruption of critical commercial operations or infrastructure.

Enhancing MDA reduces risk and facilitates collaboration. Current initiatives, such as the Interagency Operations Center acquisition, bring our partners together and integrate the collection, fusion, and sharing functions. We are developing a comprehensive network of sensors, including Long-Range Identification and Tracking and the Nationwide Automatic Identification System, and public outreach programs that advance MDA beyond our maritime borders.

This issue of *Proceedings* discusses efforts by the U.S. Coast Guard and our interagency partners to transform maritime domain awareness through a whole-government approach to policy, capabilities, and technology led by the newly formed National MDA Coordination Office. Through these efforts as well as significant new cooperation in information sharing and development of an enterprise architecture, we will jointly continue to improve MDA to meet the challenging security, safety, economic, and environmental needs of the United States.

Executive's Perspective

By Mr. Lennis G. Fludd
Maritime Administration Office of Security
Chief of Staff, National MDA Coordination Office Executive Secretariat

According to the National Plan for Maritime Domain Awareness, "MDA is the effective understanding of anything associated with the global maritime environment that could impact the security, safety, economy, or environment of the United States." Considering the "economy" piece of that definition, 90-95 percent of all goods and services enter the U.S. from the ocean. As we develop and improve MDA, we must remember who it is that we're serving.

A principal role of the Department of Transportation is to protect and improve the efficiency, resiliency, and recovery of U.S. commerce. Catastrophic events such as 9/11, natural disasters, incidents resulting in longshore stoppages, and any activity that can obstruct maritime trade are of great concern to the Maritime Administration (MARAD), specifically because these incidents can seriously impair the U.S. economy.

The MARAD's goal is to develop a more prominent role for the maritime industry in improving MDA. This goal will be realized when the maritime industry has the information and actionable intelligence it needs to protect commerce and keep the supply chain moving. Industry has the closest knowledge of maritime trade processes, activities, and concerns; they are the first to see anomalies that might be important for the U.S. government to know.

We have made significant strides toward improving MDA through maritime industry engagement in such forums as the Global Maritime Information Sharing Symposium. We have begun to reduce the number of small, less effective meetings, and are leveraging more significant venues for a broader conversation. Both government and industry are beginning to think more inclusively, and the dialogue is improving.

Continuing work should include these actions:

- Apply the lessons learned from past dialogue, working through the National Maritime Intelligence Center, the National Committee on the Marine Transportation System, the National MDA Coordination Office, and other partnerships.
- Identify a process for industry representation within the federal MDA stakeholder board governance.
- Expand outreach to industry via means such as MARVIEW[1] in order to collect and give visibility to industry's national and global concerns.
- Develop the ability to model the transportation system in order to anticipate obstructions to commerce.

In short, one of the most important ways in which we can increase MDA is by increasing our knowledge of maritime commerce. The health of our economy and the safety and security of our nation depend on it.

About the author:
Mr. Lennis Fludd is a graduate of the U.S. Merchant Marine Academy and holds a master's degree in public administration from Strayer University. He has been employed with the Maritime Administration for more than 33 years. In addition to his duties as the chief of staff for the National MDA Coordination Office Executive Secretariat, he is the functional requirements manager for the Maritime Administration's MARVIEW project.

Endnote:

1. MARVIEW is an integrated data-driven environment providing essential information to support the strategic requirements of the U.S. marine transportation system and its contribution to the economic viability of the nation.

Executive's Perspective

By Mr. Bruce B. Stubbs
Department of Defense
Director, Office of the DOD Executive Agent for Maritime Domain Awareness

Those who threaten us today care little about boundary lines. As Admiral Thad Allen, then U.S. Coast Guard Commandant, explained in the U.S. Coast Guard Strategy for Maritime Safety, Security, and Stewardship, "The challenge is enduring. The threats of the Cold War are gone, and we again find ourselves operating in an environment where piracy, illegal migration, drug smuggling, terrorism, arms proliferation, and environmental crimes are carried out by anonymous, loosely affiliated perpetrators."

To deal with these threats and challenges, world navies and coast guards require accurate and timely information on what is occurring in their maritime areas of operations. In regional and global perspectives, a shared awareness of activities within the maritime domain is key to mutual success. In short, maritime domain awareness is critical for success against all threats to U.S. citizens, interests, and friends in maritime regions, anywhere.

Since the challenges we face are global, our responses to them must be global as well. The Office of the DOD Executive Agent for Maritime Domain Awareness works with other U.S. government departments and agencies, foreign government partners, other organizations, and commercial entities worldwide to enhance our ability to know what we need to know and share critical security information.

Most fundamentally, continued and expanded cooperation and collaboration will be the keys to our common success.

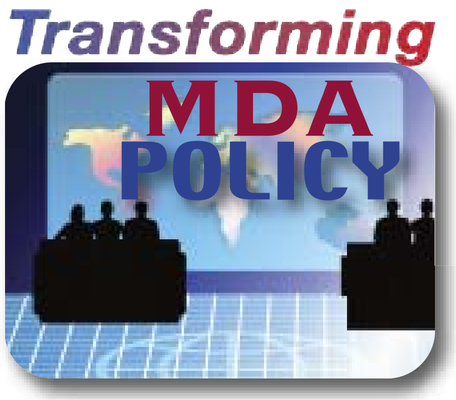
That need is crystal clear, as President Obama underscored at the United Nations in September 2009. He noted, "We have sought—in word and deed— a new era of engagement in the world. Now is the time for all of us to take our share of responsibility for a global response to global challenges."

We must encourage and expand the partnerships among navies and coast guards worldwide. Only by embracing a focused unity of effort can our common security, safety, economic, and environmental objectives in the maritime domain be achieved.

In the United States, the Office of the DOD Executive Agent for Maritime Domain Awareness is at the fulcrum of America's interagency and international collaboration for global maritime security and safety, helping to ensure stability and prosperity in an interconnected world.

For further information, see my full article in this edition.

About the author:
Mr. Stubbs is responsible for maritime domain awareness issues across the Department of Defense. Prior to becoming the director of the Office of the DOD Executive Agent for Maritime Domain Awareness, Mr. Stubbs served as the maritime security advisor to the Special Envoy for Middle East Regional Security, and was a member of the Secretary of the Navy's advisory board. Mr. Stubbs began his career as an officer in the U.S. Coast Guard, where his duties included service as military aide to the Commandant of the Coast Guard, commanding officer of USCGC Harriet Lane, *and Assistant Commandant for Capability. He also served in the U.S. Navy as a division officer during a combat tour in Vietnam, and as an instructor at the Naval War College. Mr. Stubbs received a B.S. from the U.S. Coast Guard Academy, an MBA from the University of Washington, and an M.A. with distinction from the Naval War College.*



Maritime Domain Awareness

The key to U.S. and global maritime security.

by Mr. Bruce B. Stubbs
Department of Defense
Director, Office of the DOD Executive Agent for Maritime Domain Awareness

While some ship owners quietly pay millions of dollars in ransom, the high-stakes drama of the M/V *Maersk Alabama*, seized some 250 nautical miles off the Somali coast in April 2009—the first U.S.-flagged ship to be captured by pirates since the early 1800s—underscored U.S. resolve against this threat: No negotiation and no ransom. This incident also underscored global threats to maritime safety and security—threats that respect no nation's borders.

In these burgeoning acts of piracy, many centered in the broad expanse of the Gulf of Aden and western Indian Ocean, modern-day buccaneers—in reality no more than lawless thugs—capture and hold vessels and crews for millions of dollars in ransom. In 2008, for example, pirates received some $30 million in ransom for the release of "sea-jacked" vessels, and pirates seized 42 vessels off the coast of Somalia alone.

Globally, pirates held 889 mariners hostage as ransom negotiations dragged on. The International Maritime Bureau reported pirates murdered 11 mariners, and another 21 were missing and presumed dead. These trends continued throughout 2009 and into 2010, and included attacks in South American and Caribbean waters. Ominously, pirates are willing to conduct operations at greater distances from shore—more than 600 nautical miles off Somalia, for example—and are displaying more sophisticated tactics, techniques, and procedures.

That said, we also have to be concerned about traditional military threats and what are now being described as "irregular" or "hybrid" threats that combine the conventional with the unconventional and the nation-state with transnational actors. Many of these threats originate in or take advantage of the anonymity afforded by the maritime domain. Understanding the nature of these and many other challenges is critical to global security.

MDA Is Vital

Thus, a global perspective is needed to ensure we can detect and deal with threats that originate in or take advantage of the vastness of the oceans. And, while the "domain" element of maritime domain awareness (MDA) might carry nuances of "dominion," we know that most of the world's ocean space lies beyond any single government's control, resulting in what some are now describing as the global "contested commons." Within this context, moreover, the historic principle of the freedom of the high seas challenges the ways in which we can reasonably put in place governance that makes sense and is effective—something that will require collaboration and cooperation among maritime and landlocked governments everywhere. Only through collaboration and cooperation will we be able to ensure that these global threats and challenges can be dealt with as far from our shores as possible.

From the U.S. perspective, this is a daunting proposition, given that the domestic U.S. maritime domain totals more than 3.4 million square miles bordering some 95,000 miles of coastlines and includes 361 ports that are the entry points to a vast inland system of rivers and waterways, connecting America's heartland to the world.[1]

However, the challenge is even greater, given that U.S. interests are global and our common prosperity depends on the open sea lanes that carry the bulk of the world's commerce. With 70 percent of the earth's surface covered by water—throughout which more than 135,000 large commercial vessels, thousands of warships, and millions of smaller vessels and craft operate every day—separating the "bad guys" intent on doing us harm from all other legal traffic is a monumental task.

Several capstone documents and a presidential directive define MDA. Our most important guidance is the December 2004 National Maritime Security Policy (National Security Presidential Directive 41 and Homeland Security Presidential Directive 13), which was the catalyst for the president's 2005 National Strategy for Maritime Security and its eight supporting plans, particularly the National Plan to Achieve MDA.

At its most fundamental, maritime domain awareness supports a broad spectrum of operations. From our perspective, MDA is a global process to understand what is going on in the maritime domain, how that might affect our vital interests, and how best we should respond across a broad spectrum of traditional and transnational threats to the good order and security of the maritime commons, and, by extension, to national homelands, as well.

However, MDA is not a specific mission area or "thing." Instead, maritime domain awareness is an enabler of capabilities for actionable intelligence, informed decision making, and effective responses to a complex set of problems shared by all nations.

Executive Agent for MDA

That is the primary reason why the Office of the DOD Executive Agent for Maritime Domain Awareness was established in August 2008 and placed within the Department of the Navy: to help enable MDA throughout the Department of Defense, the U.S. interagency community, and with our friends and partners worldwide. There are several important elements to this.

First, from the maritime perspective, the MDA challenge is enormous, extending to all ocean areas and the subsurface, surface, and air/aerospace "domains." Given the focus on maritime awareness, the Department of the Navy was the natural choice for the office.

Second, the need for effective MDA expands beyond traditional single-service concepts of situational and battlespace awareness. We must address, for example, threats well inland from the coasts at the beginning of the global maritime supply chain (particularly with regard to weapons of mass destruction), and how the high seas continue to be largely ungoverned space.

Third, the Office of the DOD Executive Agent for MDA transcends single-service approaches and helps align efforts among many organizations. For example, the U.S. intelligence community crosses multiple U.S. government domains, with 21 individual organizations in numerous departments, including defense, energy, homeland security, justice, state, and transportation. Integrating and aligning such diverse intelligence-focused agencies for "all-domains awareness" is proving to be a daunting challenge.

Finally, MDA cannot be a segmented sphere that is alongside but separate from the land, air, space, and cyber domains. If we are to achieve our critical goals, we need broad and deep collaboration and cooperation among interagency, other government, international, and industry partners at home and abroad crossing physical, geographical, cultural, and governmental boundaries. In this way we will achieve a "whole-of-government" solution to maritime domain awareness and a crucial way by which maritime security and safety can be assured.

In short, the office is responsible for:

- increasing communication and building trust in the United States and overseas,
- performing international and domestic outreach,
- making maritime information available and easily shared.

From an international perspective, this already has a significant impact on the way we are focusing on a global MDA capability. Our tasks are to align, guide, and advocate efforts focused on but not limited to the maritime domain. We serve as the U.S. "bridge" that links domestic and international efforts to provide the right information to the right organization at the right time to safeguard the security of the global maritime commons.

There is thus increasing emphasis among naval and maritime forces worldwide to improve partnerships and increase data sharing as important ways to enhance maritime domain awareness. The responsibility for MDA primarily belongs to world navies and coast guards, but none of them, including the U.S. Coast Guard and Navy, have the resources and manpower to do everything needed. Only by sharing maritime information and data as widely as possible will navies and coast guards have the collective means to perform their vital missions.

The "Contested Commons"

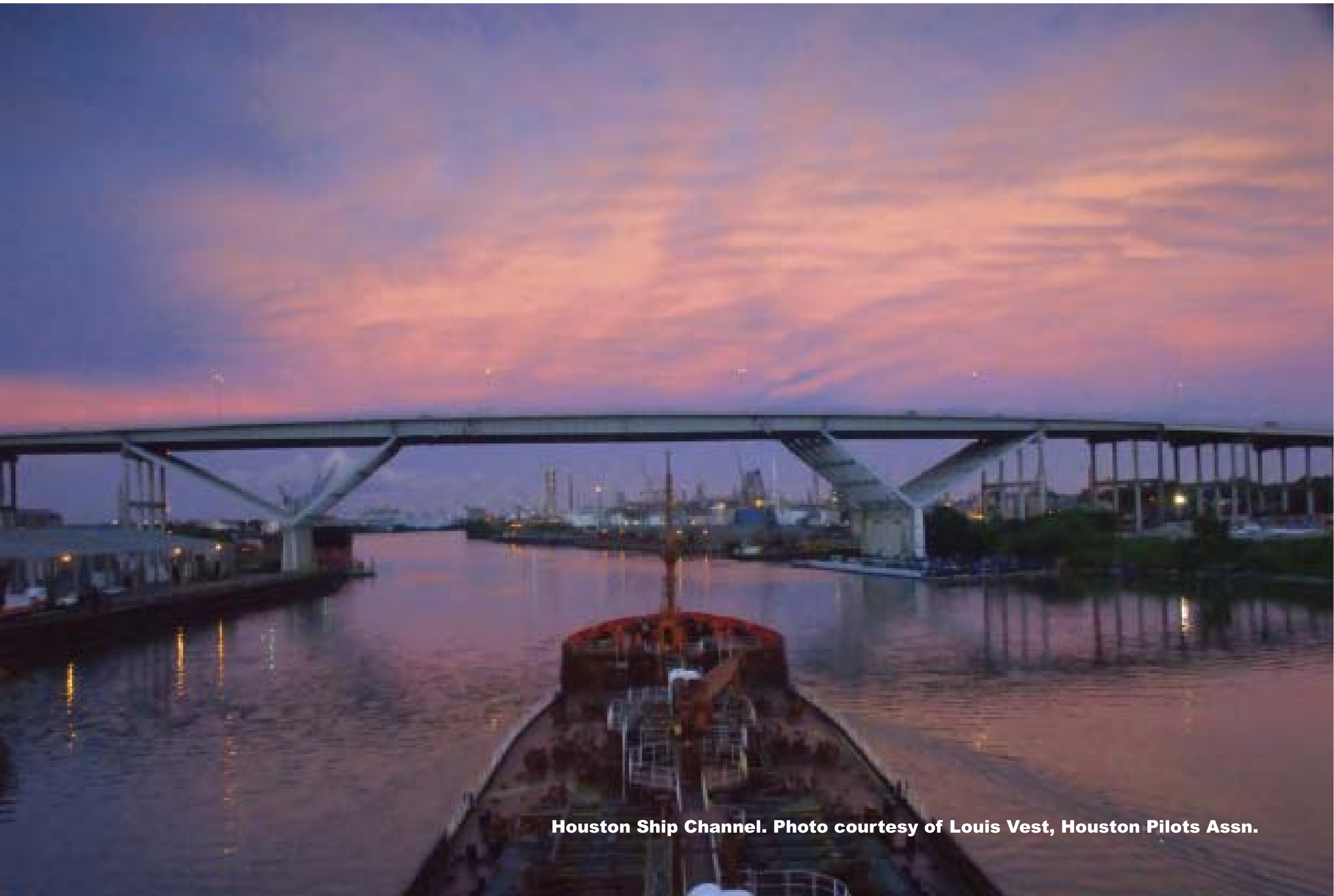
In the July 2009 U.S. Naval Institute *Proceedings,* Under Secretary of Defense Michelle Flournoy and her co-author stated: "The U.S. military will increasingly face three types of challenges: rising tensions in the global commons; hybrid threats that contain a mix of traditional and irregular forms of conflict; and the problem of weak and failing states ... The task for the United States is to respond to these challenges with a whole-of-government approach that advances our interests while legitimizing our power in the eyes of others."

These insights continue to shape our strategies, plans, and programs for cost-effective MDA in the U.S. domestic maritime domain and throughout the world.

About the author:
Mr. Stubbs is responsible for maritime domain awareness issues across the Department of Defense. Prior to becoming the director of the Office of the DOD Executive Agent for Maritime Domain Awareness, Mr. Stubbs served as the maritime security advisor to the Special Envoy for Middle East Regional Security, and was a member of the Secretary of the Navy's advisory board. Mr. Stubbs began his career as an officer in the U.S. Coast Guard, where his duties included service as military aide to the Commandant of the Coast Guard, commanding officer of USCGC Harriet Lane*, and Assistant Commandant for Capability. He also served in the U.S. Navy as a division officer during a combat tour in Vietnam, and as an instructor at the Naval War College.*

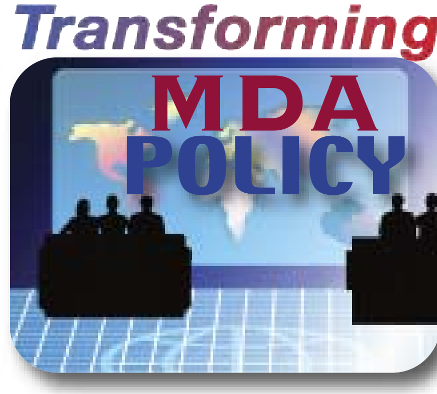
Mr. Stubbs received a B.S. from the U.S. Coast Guard Academy, an MBA from the University of Washington, and an M.A. with distinction from the Naval War College.

Endnote:
1. The U.S. Coast Guard Strategy for Maritime Safety, Security, and Stewardship.



Houston Ship Channel. Photo courtesy of Louis Vest, Houston Pilots Assn.

Breaking Down Barriers



Managing successful information sharing.

by CAPT David F. Sanders, JAGC, USN
Legal Counsel
National MDA Coordination Office Executive Secretariat

Information sharing is a central element of the current administration and pervades discussion within the executive branch. Open government, transparency, and the free flow of information among federal agencies and state and local governments is the new ideal. Government employees, civic leaders, educators, the private sector, and the technologically savvy American public all seek to institutionalize information sharing efforts at all levels of government.

In this age of information, there has arisen a clarion call to cross barriers, break down stovepipes, create technology, and foster policies and programs to share information. The "push-button" expectation for instant information demands instant action and instant sharing. Juxtaposed thereto are various barriers that can stall or prevent successful information sharing.

The Purpose

The primary purpose of effective information sharing is to improve public safety, national security, trade, commerce, and infrastructure. Effective information sharing employs a combination of collection, storage, dissemination, and analysis, resulting in an understanding of not only what is happening, but what it means. This allows responders to prepare and deliver a successful response to a recognized or perceived threat.

In addition, trust is the underpinning of information sharing. It is acknowledged that systems security must be inherent in information transfer to merit trust. It is mandatory that participants in the information flow must trust and be trusted in the proper protection of information and sources. Beyond these basic notions is the subtle realization that the American people must trust their government.

Sharing information, therefore, dispels any notions of secrecy, opens the curtain of government operation, engenders public confidence, and reinforces the concept of ownership by the people. First, government must make information available to the public. Secondly, government must be positioned to receive information from the public. Finally, government must effectively share information "within the castle."

Barriers to Information Sharing

Barriers can generally be classified into five categories. They include:

- natural barriers,
- bureaucratic barriers,
- legal barriers,
- administrative barriers,
- technical barriers.

While each type of barrier hinders the proposed sharing, let us recognize that not all barriers are bad. At times, barriers to information sharing are enforced to affect a purpose, including the protection of individuals, national security, and privacy, as well as protection of proprietary information and intellectual property. The goal is not to eliminate barriers, but to manage those barriers effectively.

Each purported barrier to information sharing must be examined and understood. Until recently, the default position within the government was to simply not share. This culture must be reversed and replaced with an expectation to share information. New information sharing barrier resolution efforts must be founded upon the new presumption that information will be shared to the greatest extent permissible.

Natural Barriers

The first "natural" barrier to information sharing is that individuals may have a tendency to work alone. Students, employees, and even managers are graded, recognized, and rewarded on individual effort. "Teamwork" can be a buzzword in many cases—not a practice. To overcome this tendency, measures of success must encourage, recognize, and reward information sharing, not penalize it.

Additionally, the concept of "information is power" can no longer have validity in an informed government. Hoarding, holding, or manipulating information accruing to the public benefit cannot be tolerated. These natural barriers to information sharing must be managed by policy and practice to result in effective sharing.

Bureaucratic Barriers

While serious information sharing efforts are underway within government, they are not yet institutionalized. Residual doubt as to the value of information sharing belies a true belief in the cause and emboldens naysayers.

Unequivocal bureaucratic acceptance must be used as a principal tool to manage these barriers . A clear, single-source mandate to share information to the greatest extent possible and permissible must be published and adopted. This may take the form of legislation or an executive order.

Each of the executive departments of the federal government must be formally required to share information within their purview, and each agency within that department must then establish clear policy that advocates information sharing. Education of all hands in the art and science of information sharing must follow. Put simply, to achieve success, there must be a clear mandate to share, an acceptance of the practice to share, and reinforcement of the policy and practice via education, evaluation, recognition, and reward.

Legal Barriers

There are myriad legal barriers to information sharing, including the Privacy Act, the Trade Secrets Act, and provisions of other legislation. Contractual language most often restrains the transfer or sharing of information purchased by the government from a commercial source.

American law favors the privacy of individuals and any notion of government spying on American citizens within America is generally abhorrent to the public. Additionally, trade, commerce, banking, and technological information is rightly protected. However, legislation, case law, patent protection, policy, presumption, and public interest do not prevent the proper and prudent transfer of information. Misconception does. It is the failure to properly manage information sharing disputes that constitutes the principal barrier to effective information sharing.

An efficient new barrier resolution plan must include a formal procedure to resolve information sharing disputes among agencies within a department as well as disputes between departments. That formal procedure should be modeled after prevailing alternative dispute resolution practices and include a final arbitrator with the authority to resolve the dispute.

Administrative Barriers

These impediments include classification of information and resulting restrictions on transferability. This barrier is self-imposed and can, consequently, be self-managed. Recent interagency reports indicate that federal agencies use nearly 60 different "sensitive but unclassified" designations to protect information without a policy or procedure to ensure uniformity. This leads to an administrative presumption against sharing.

Current barrier resolution efforts include a government-wide review of these classifications. This barrier can be resolved through uniformity of classification, a common understanding of the applicability of the classifications, and a common-sense approach to initial classification application to information.

Technical Barriers

Technology in itself is not a barrier to information sharing—it can be a tool to accomplish it. Barriers are those restrictions placed upon technology. Technology must operate to carry out the information sharing scheme of an organization in step with its law, policies, and programs.

Barrier management must begin in the design of the technology system that delivers the information. Before we get to *how* to share, we must decide what we want to share and why we want to share it. Who needs the information? What will the information be used for? With whom will it be further shared, and how will it be protected? The answers to these policy questions can be incorporated into the operation of the information system. Managed input of reasonable restrictions to the information system ensures managed and reliable output, prevents future violations of law and policy, and prevents information sharing disputes.

The Goal

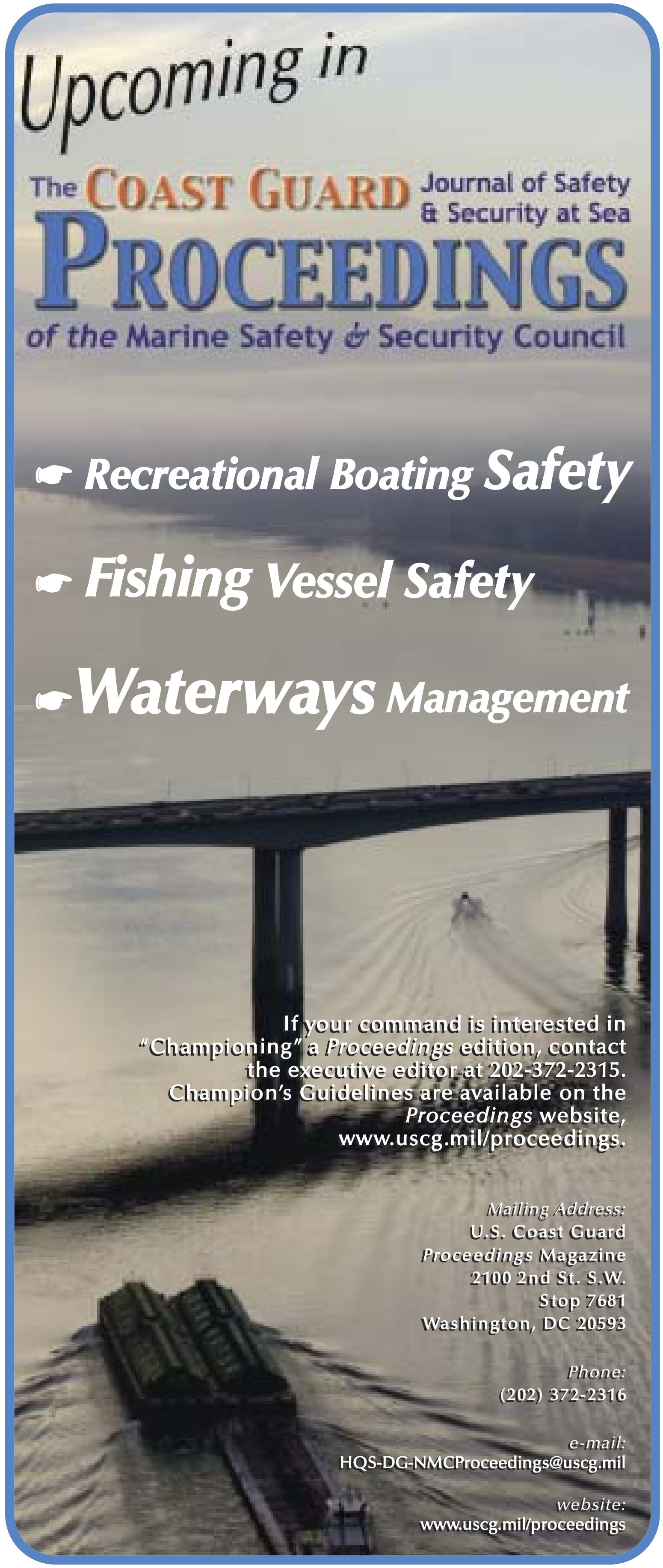
Management of barriers to information sharing is not a legal problem, but a systemic problem that requires a comprehensive and coordinated approach. This must begin with a clear mandate by the federal government to share information to the greatest extent possible and permissible under law and regulation.

A managed approach must be supported by policy and practice. Successful efforts are underway at all levels of government to manage information sharing barriers, change the information retention culture, design effective delivery systems, and forge a common-sense approach.

The signal is clear. Barriers to successful information sharing must be managed to allow the delivery of accurate and timely information to those able to use it for the greatest protection of the American public.

About the author:

CAPT Sanders currently serves as legal counsel to the National MDA Coordination Office Executive Secretariat. He is a graduate of the University of Rhode Island and holds a Juris Doctorate from the Western New England School of Law and an MBA from Golden Gate University. His prior assignments include the International Law Department of the Naval War College, the Iceland Defense Force, and Naval Legal Service Offices in San Francisco, Newport, and New London.



Implementing the "One DHS" Policy

The DHS information sharing agreements process and tools.

by Ms. Irene Hoffman Moffatt
Senior Policy Analyst
U.S. Coast Guard Maritime Domain Awareness and Information Sharing

The Department of Homeland Security's mission to detect, interrupt, and prevent threats to homeland security is ever critical. As such, sharing intelligence information among DHS components is one of the department's highest priorities.

As stated by DHS Secretary Janet Napolitano, "It is important that we develop an identity for DHS that is centered on the department's mission and that we build a 'one DHS' culture among the different components."[1]

In a nutshell, the "One DHS" policy acknowledges that although the Department of Homeland Security is comprised of multiple components, it is nevertheless a single unified entity. Therefore, all relevant information generated and received by individual entities within DHS is to be accessible to and shared between and among all other DHS components.

This policy replaces the former "need to know" criterion for information and intelligence sharing with the new "responsibility to share" model, in which no DHS component should consider another DHS component to be a separate agency for information sharing purposes.

Information Sharing Access Agreements
Additionally, information sharing and access agreements (ISAAs) are vehicles used to exchange, receive, and share information from external (non-DHS) parties.

All ISAAs are subject to mandatory compliance review by the originating DHS component and the Information Sharing Coordination Council, which is comprised of action officers from various DHS components.[2] Agreements that have not been through this One DHS policy compliance review or that conflict with the One DHS policy cannot be executed.

Compliance is achieved if the terms of the ISAA do not limit dissemination of the information for an authorized purpose.

ISAA Repository
The ISAA Interim Repository is a database of more than 700 information sharing and access agreements between DHS and its external partners. It is a useful resource for exploring the breadth of existing DHS external partnerships, identifying existing agreements that satisfy current data needs, or to use as templates for future agreements. It's currently maintained by the Office of Intelligence and Analysis Information Sharing and Collaboration Branch.

Soon, components will be able to perform searches independently using the Data Architecture Repository within the DHS Enterprise Architecture Information

Repository. This web-based application will house the ISAAs, along with other data assets, providing a searchable tool for the entire department that can also be updated. Until then, the Office of Intelligence and Analysis Information Sharing and Collaboration Branch remains available to assist with ISAA search requests.

ISAA Methodology Guidebook

The most current resource regarding information sharing and access agreements and the One DHS policy is the ISAA Methodology Guidebook. It presents appropriate policies, responsibilities, procedures, and other necessary information needed to develop, coordinate, approve, execute, catalog, and negotiate disputes involving all ISAAs.

It defines relevant terms; describes the steps to develop, draft, and archive an information sharing and access agreement; and provides ISAA templates and information about special circumstances such as One DHS policy compliance exemptions and handling classified ISAAs.

To obtain a copy of the ISAA Methodology Guidebook, contact the DHS Office of Information and Analysis Information Sharing and Collaboration Branch at isaa@dhs.gov or call (202) 282-9400.[3]

Acknowledgment:
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Endnotes:

1. Congressional testimony.
2. USCG-specific review and clearance steps for ISAAs will be published in a revised ISAA Methodology Guidebook.
3. The current guidebook is being revised, but remains the prevailing guidance until further notice. Coast Guard guidance regarding the One DHS ISAA review and implementation process will be addressed in COMDTINST 5216.18. Modifications to the Commandant Instruction will be finalized once revisions to the guidebook are complete.

Maritime Domain Awareness Opportunities

Outreach to the global community of interest.

by CAPT Dale Ferriere, USCG
National MDA Coordination Office Executive Secretariat

Achieving maritime domain awareness (MDA) through effective outreach to the global maritime community of interest (GMCOI) requires an earnest appreciation for what MDA is, an understanding about cultural and budgetary influences that adversely affect information sharing partnerships, and a situational understanding concerning the diverse needs and requirements of each GMCOI member.

The National Concept of Operations for Maritime Domain Awareness defines MDA as: "The effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy or environment of the United States."

Understanding and Appreciating MDA

This all-encompassing definition may take on several different meanings, depending on individual GMCOI members' requirements and vulnerability, which can open opportunities to share and analyze MDA information from several perspectives. For example, at a recent international maritime security conference in the

Caribbean, a presentation by U.S. Navy and Coast Guard representatives showed threat vectors coming from South America and the Caribbean through the maritime domain toward the U.S. In contrast, threat vectors presented by Caribbean and South American government representatives also showed vectors coming through the maritime domain, but in a different direction. At this moment, the conference could have quickly deteriorated into a finger-pointing exercise among representatives. However, the group quickly acknowledged that threat vector directions are shared and realized that maritime domain awareness objectives should also be shared.

In addition to salvaging the conference schedule and cooperation, this event set the stage for more effective inter-government information sharing and partnering. This moment represented a critical outreach step that recognized the diverse needs and requirements of each GMCOI member and how these diversities present opportunities for brokering partnerships, which can concurrently improve each member's maritime domain awareness.

Checks and Balances

This example demonstrates how the National MDA Coordination Office (NMCO) Executive Secretariat is ideally situated as a broker and catalyst to help build GMCOI partnerships and institutionalize information sharing, resulting in true maritime domain awareness. The NMCO Executive Secretariat is a diversified national interagency office with experienced members assembled from the U.S. Navy, Coast Guard, Maritime Administration, National Oceanic and Atmospheric Administration, and reservists with shipping industry experience.

This diversification allows a unique perspective with a tremendous amount of first-hand expertise in maritime operations and planning that includes understanding how MDA situational awareness is dependent upon listening, learning, partnering, and sharing. What makes the National MDA Coordination Office Executive Secretariat so unique is that its leadership and membership is not beholden to any single federal department. Because of its diverse membership, transparent leadership, and national focus, it is easier for a staff member to detect and challenge any parochial or self-interested community among the other staff members while pursuing MDA.

Because staff members hold each other accountable, the NMCO Executive Secretariat creates a workplace culture that consistently works toward ensuring organizational objectivity and diversity. As a result, the office can be an honest broker to help arbitrate issues. Additionally, since the NMCO Executive Secretariat's customer base includes representatives from various port facilities, coastal state navies, coast guards, fisheries, intelligence communities, military communities, marine environmentalists, municipal law enforcement agencies, port authorities, supply chain specialists, and the comprehensive maritime industry, diversity is critical for it to reach out to the greater global maritime community of interest.

Recognizing Synergies

Maritime domain awareness is not a stand-alone program or command. Essentially, MDA is an "enabler." Achieving maritime domain awareness is dependent on partnerships. Successful GMCOI partnerships are built on a collaborative willingness to share information, since individual situational awareness can be proportionately increased as the size of the information partnership expands.

Each successful partnership further institutionalizes the information sharing processes. This process is very much an "A to B" progression. Building partnerships among players is stage "A." Stage "B" occurs when those same partners institutionalize the information sharing process. This progression results in maritime domain awareness whose ultimate clients are persons responsible for command and control, or C2.

Oftentimes members of the GMCOI with non-civilian operational backgrounds may not realize that maritime commerce (such as ship management, cargo operations, marine terminal operations, supply chains supporting just-in-time delivery, commercial fisheries, tug and tow operations, or passenger vessel operations) includes C2. Members working to achieve an enhanced MDA are basically working to enhance access to information.

In turn, the member's access to situational analysis helps each type of command and control improve its performance with respect to security, safety, environmental protection, and commerce. Improved maritime domain awareness results in measurable productivity in operations and allocation of operational assets. This leads to increased detection of illicit supply chains and vessels smuggling contraband, larger amounts of seized contraband per boarding, bigger cargo throughputs at seaports and marine terminals, and heightened

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Vessel Information Hub

Standing up the Vessel Information Hub (VIH) in accordance with the National MDA Concept of Operations has resulted in improved interagency coordination of vessel information management, collection, fusion, analysis, and dissemination. VIH membership is highly diverse, with representation from several cabinet-level departments, the intelligence community, and more than 40 different agencies working together to identify and resolve vessel-related gaps in interagency information sharing.

The VIH also established focus teams that are working to improve vessel information sharing processes, standards, and technologies as well as the automated information exchange. Additionally, VIH's triumvirate-based leadership and governance structure (consisting of executive and senior officers from the National Maritime Intelligence Community, Office of Naval Intelligence, and the Intelligence Coordination Center) has created increased internal review and accountability.

The Vessel Information Hub has also been very supportive of the development of the national service-oriented architecture "as-is" model, and has been highly instrumental in getting its stakeholders to recognize the potential and the "force multiplier" effect of a more holistic approach to vessel information sharing.

Architecture Management Hub

The National Concept of Operations for Maritime Domain Awareness (MDA CONOPS) calls for development of a national global service-oriented architecture. The MDA CONOPS recommends that the Department of Navy Chief of Information (DON CIO) lead an interagency management team in drafting an "as-is" model depicting existing information sharing processes, as well as a "to be" model.

The CONOPS also calls for each of the pillars of MDA—including people, vessels, maritime infrastructure subject matter experts, and lead agencies—to share insight and specific details about their information sharing processes with the DON CIO to map the "as-is" blueprint. Citing the interagency nature of this objective, a hybrid architecture framework is being used, based on the Department of Defense Architecture Framework.

Marine Safety and Security System

The U.S. Department of Transportation's Volpe Research Center created the Marine Safety and Security Information System (MSSIS). Through an Automatic Information System (AIS) signal that contains vessel data, MSSIS technology is able to easily process the VHF-FM output for a standard personal computer, thus providing end users with a non-classified geographic depiction of the emitting vessel's locations and track lines.

Outside of formal U.S. Navy programs, Admiral Ulrich, then the commander of U.S. Naval Forces Europe, harnessed MSSIS technology as an inter-government information sharing catalyst that directly resulted in 22 nations along the Mediterranean Sea sharing their AIS inputs and outputs with one another. Admiral Ulrich's initiative has been leveraged to expand inter-government AIS vessel data sharing to more than 60 countries.

MDA Stakeholders Board

As one of the plans that supports the U.S. National Strategy on Maritime Security, the National Plan to Achieve MDA (NPAMDA) calls for establishing a maritime security interagency policy committee and a maritime domain awareness implementation team (MDA–IT).

The MDA–IT has subsequently matured into the MDA Stakeholders Board, whose purpose is to implement NPAMDA's tasks and subordinate documents, including the National Concept of Operations for MDA and the Interagency Investment Strategy. This group has accomplished the following:

- approved the architecture management hub plan,
- approved the information sharing hub implementation plan,
- approved the interagency solutions analysis execution plan,
- approved the information hub charter and the interagency information sharing subcommittee charter.

The MDA Stakeholders Board has also provided oversight for global outreach by strongly supporting MSSIS as an essential tool to help build global MDA.

Global Maritime Information Sharing Symposium

At the Global Maritime Information Sharing Symposium (GMISS 2009), more than 200 attendees representing a cross-section of domestic and international industry representatives, including several successful and growing U.S.-based (Marshall Island and other foreign-flagged) shipping company executives discussed how to facilitate commerce while also improving maritime security, safety, and protection of the marine environment.

Several workshops were held to examine how industry representatives could become more involved in the development of government policies about information sharing, counter-piracy, and other issues. These workshops will be sustained throughout the forthcoming fiscal year and will report results at GMISS 2010.

Automated Information Sharing

After months of working through policy and legal barriers, including strict adherence to laws protecting privacy and proprietary information, U.S. Customs and Border Protection and the National Maritime Intelligence Center were able to establish automated cargo and vessel information sharing processes, improving overall analytics and threat assessments.

This significant breakthrough occurred specifically because of the synergy between the two agencies that grew while both were working toward the common cause of achieving MDA. It is important to note that this synergy could not have taken place without the support of the MDA stakeholders board and interagency investment strategy subcommittee.

Using MSSIS+ to Assuage Adverse Public Perception

Siting liquid natural gas (LNG) terminals within the United States has proven to be extremely challenging, especially within the U.S. Northeast and U.S. West Coast regions. Despite a nearly flawless operational history, in some instances risk perception of LNG operations overwhelmed accepted risk-based modeling, leading to adverse public perception.

To address this perception, a leading LNG operator and a leading USCG sector began sharing the LNG carrier's AIS data and location en route, including the location of all nearby ships. A next version MSSIS (MSSIS+) was prototyped, which successfully demonstrated the possibility of digitally integrating radar and AIS signals, resulting in increased fidelity of vessels and ships operating within the vicinity of the LNG carrier.

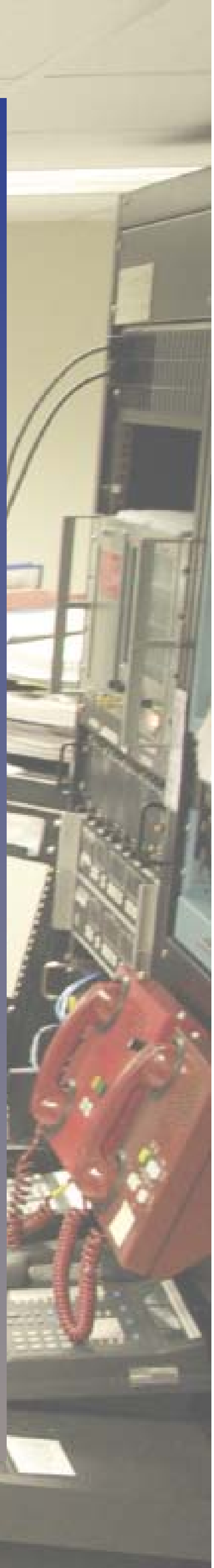
This information was subsequently availed to local groups, helping to mitigate their concerns and perceptions regarding potential LNG carrier collisions.

Challenging "For Official Use Only" Classification

When determining whether a ship's ownership, management, cargo, or crew presents a threat to a U.S. arrival port, an assessment takes into consideration any relational aspect the ship, cargo, or crew may have with countries known to harbor or associate with terrorists.

When aspects are identified as having a nexus with a listed terrorist country, the laden ship is detained at an outer anchorage or turned away and denied entry into port. The assessment process originally did not allow for information about countries having a terrorist nexus to be shared with U.S. charterers, since the document identifying the State Department's list of terrorist nations was deemed as "for official use only." Consequently, charterers representing U.S. commercial cargo interests could have their cargoes delayed without any background knowledge of the catalyst for the U.S. Coast Guard captain of the port's decision.

A subsequent review of policy and re-assessment of the associated risk of sharing this information with U.S. charterers resulted in revised procedures. By being made aware of the list of countries having a terrorist nexus, charterers are now able to better understand the policy's intent and can become a partner in helping to vet the risk.



capacity to quickly recognize legitimate ships, crews, and cargoes.

As a result, stakeholders are quickly realizing that collaboration and sharing with other GMCOI stakeholders is mutually beneficial. The fruits of MDA include improved partnerships, increased information sharing and interoperability, superior awareness, and completion of mutually beneficial objectives.

However, achieving maritime domain awareness is not limitless. There is an end goal, but achieving that requires continual action by all members. Similar to the International Organization for Standards for Quality, GMCOI stakeholders strive to continuously improve C2's capabilities to enhance their safety, security, commerce, and environmental protection operations more efficiently and with greater resolve.

Defining the GMCOI

From an outreach perspective, MDA is an opportunity to develop and create partnerships that are beneficial to all global maritime community of interest members. Each GMCOI member should embrace each other as a potential MDA partner.

In order to achieve MDA, each member of the GMCOI has potential information to share among the other partners. Regardless if the member is a commercial or government representative, a symbiotic relationship exists when there is better maritime domain awareness. The essential ingredients for MDA (collaboration, partnership, and information sharing) require that each member put aside any preconceived judgments, parochial interests, and other selfish leanings. MDA has no place for "turf wars." Identifying common maritime domain awareness issues and objectives requires active participation by all parties.

By no means does building partnerships and achieving MDA mean giving potential "bad operators" a free pass. Rather, maritime domain awareness partnering means that those performing risk assessments need to look more closely at their criteria and processes in identifying how partnering with higher-risk maritime industries can create the opportunity for mutual and effective risk and threat mitigation.

Appropriately Mitigating Risk

For example, public perception is that transportation of liquefied natural gas (LNG) by marine conveyance is a high-risk activity. Within the marine community, however, ship owners and operators involved in the transportation of LNG by marine conveyance are considered high-*quality* operators.

Entry costs into the LNG trade are extremely high as compared with other bulk liquid cargo trade. In general, freight rate premiums are paid by cargo owners to transport LNG to cover costs arising from any potential operational anomalies.

Some parts of the U.S. view LNG operations as overtly high-risk, thus requiring high-intensity security operations. In contrast, on the other end of the risk spectrum are bulkers or freighters lifting low-end cargoes such as salt or gravel. First, there's relatively no concern about changes in cargo quality or value with these cargoes from load port to discharge port. Furthermore, pay for seafarers on these bulkers is substantially lower than on LNG vessels because the associated level of training required for cargo handling and maintenance on these ships is much less.

So which seafarers are more likely to be involved with illegally importing contraband? Those on the lower end of the pay scale or those on the higher end? In some regions, bulkers lifting low-end cargoes don't receive a fraction of the security oversight that LNG carriers do. True maritime domain awareness and information sharing synergies among security and commercial interests could bring such possibilities to light and result in additional mutually beneficial risk mitigation techniques.

Next Steps

Since stand-up of the MDA Implementation Team in 2005 (and the MDA Stakeholder Board in 2008), it has been observed that the federal budgetary process can limit interagency agreements to share information and collaborate. To truly achieve maritime domain awareness, a new methodology of how MDA projects are budgeted is recommended, thereby encouraging better multi-agency collaboration.

Moving Toward Collaborative Budgeting

One possibility is to establish a pool of MDA funds allocated against any critical gaps in order to access future potential MDA project funds. Revising and implementing economic incentives that encourage multiagency collaboration in the budget proposal process could institutionalize effective interagency information sharing and collaboration.

The MDA Stakeholder Board (MDA SHB) approved a charter establishing an interagency investment strategy subcommittee in April of 2009. Since then, the Interagency Solutions Analysis working group drafted the Interagency Solutions Analysis Execution Plan, which received MDA SHB approval at the October 2009 meeting. The primary objective of the plan is to use existing capabilities-based analysis to identify gaps and create a "whole-of-government" approach toward resolving each gap. This is a first attempt at breaking down budgetary silos that prevent effective interagency collaboration and limit optimal public services.

International Maritime Industry Outreach

Anecdotal evidence strongly suggests that the majority of legitimate shipping companies want to be a part of achieving maritime domain awareness. As the 2009 Global Maritime Information Sharing Symposium demonstrated (see sidebar), the maritime industry has a vast amount of mostly yet-uncovered information available to achieve and improve maritime domain awareness.

Agencies responsible for building maritime awareness are experienced, knowledgeable, and capable. Nevertheless, the ability to prevent an emerging terrorist threat or threat of illicit importation of contraband is always challenged by those who wish to do harm or who attempt to use supply chains and shipping to circumvent the rule of law.

So how does the government leverage maritime industry outreach? The dilemma for the government is deciding how to partner with legitimate operators and gain access to their insights without demonstrating favoritism and creating an unfair market. U.S. and international laws are very strict about protecting proprietary trade interests and privacy. These justified barriers to information protection must be respected.

MDA Down Under

The Australian approach, which was energized by the Bali bombings, has industry representatives from each critical infrastructure sector leading information sharing processes, with applicable federal and state agencies as members to support each information sharing working group.

In this scenario, the Australian Ministry of Justice serves as an oversight body to ensure laws protecting proprietary interests and privacy are observed, while each of the working groups collaboratively work toward improved domain awareness.

This example demonstrates the possibility of global maritime community of interest outreach that effectively leverages commerce and is recommended as a "next step" toward the goal of achieving MDA.

About the author:
CAPT Dale Ferriere, USCGR, has 29 years of Coast Guard experience. His primary Coast Guard competencies are marine safety, marine environmental protection, emergency management, and contingency planning. Prior to his MDA assignment he helped develop vulnerability assessment plans for Sector Puget Sound and Sector Northern New England's Area Maritime Security Plan and Port Facility Auditing Protocols. His civilian occupations include teaching oil spill response for Texas A&M University, manager and designated person ashore for Teekay Shipping, consulting business proprietor performing shipboard ISO 9001/14001, ISM Code and ISPS Code auditor, and deputy director at the National Infrastructure Institute—Center for Infrastructure Expertise. CAPT Ferriere holds a Bachelor of Science degree in marine engineering and a Master of Science degree in environmental management.


Photo courtesy of the Port of Los Angeles.

Transforming MDA Capabilities

Interagency Solutions Analysis

The state of interagency MDA requirements.

by Mr. Hank Blaney
Policy Analyst
U.S. Coast Guard Maritime Domain Awareness and Information Sharing

Several intelligence sources report reliable "chatter" that indicates terrorists will attempt to smuggle WMD components into the U.S. by small boat—but sources don't know where this delivery is expected, and don't know how to determine which small boats are making the delivery.

A long-time U.S. ally, a small island nation, finds itself being illegally blockaded by an aggressive and much larger neighboring country. What maritime information can be used to enhance the safety of U.S. and allied forces in the area—and how?

A small cargo vessel with cargo destined for the U.S. suffers an explosion in a Central American port. Police investigation uncovers a plot to detonate similar devices in unspecified U.S. ports. Which other vessels and ports are targeted, and how do we find out without causing a major disruption to commerce?

A massive earthquake and subsequent tsunami strike Indonesia, with major damage to port facilities in Singapore, Malaysia, and Indonesia. The U.S. and other nations are asked for humanitarian aid and assistance in restoring the maritime transportation system. How can maritime domain awareness enable timely, effective decision making and contribute to restoring the flow of commerce in this area, which is so critical to the world's economy?

These scenarios illustrate the global nature of maritime domain awareness (MDA), which is an immense responsibility that far exceeds the capabilities of any one organization, particularly one as small as the Coast Guard. Coast Guard leadership recognized this even prior to 9/11, and was at the forefront of the effort to recognize the importance of partnerships with other maritime stakeholders throughout the world.

In the years following 9/11, a collection of federal agencies with major responsibilities for maritime domain awareness drafted the National Plan to Achieve MDA.

These partners recognized that a national investment strategy would be required to ensure that the government achieved effective MDA in a coordinated, efficient fashion. A first step, the 2007 Interagency Investment Strategy, compared tasks required for effective national MDA with current capability, determined where gaps existed, and made recommendations as to which departments should mitigate or eliminate these gaps.

A U.S. Coast Guard maritime safety and security team participates in a boarding exercise in the Gulf of Aden near the USS *Anzio*, the flagship for a multinational task force conducting counter-piracy operations. Photo courtesy of the Department of Defense by Mass Communication Specialist 2nd Class Brian K. Fromal, U.S. Navy.

As the interagency maritime domain awareness governance process matured, and a new administration emphasized "whole-of-government" problem solving, the MDA Stakeholder Board, under the auspices of the National Security Council's Maritime Security Interagency Policy Committee, directed the next steps in resolving national maritime domain awareness shortcomings—the Interagency Solutions Analysis (IASA) .

A team of MDA professionals drawn from throughout the federal government, the IASA Working Group is:

- verifying and prioritizing maritime domain awareness gaps;
- recommending interagency solutions to mitigate or close the gaps;
- providing strategic planning, budget, and acquisition documentation necessary to facilitate the improvements.

Verifying the Gaps

MDA stakeholders throughout government and industry have been very active in the years since the interagency investment strategy was written. It is very possible that this progress—either by the efforts of a single organization or through a combination of various projects—has resulted in the elimination of some of the gaps. The investment strategy included some priority determinations concerning the gaps, but a more formal prioritization based on today's global environment is required.

Additionally, other entities have conducted somewhat similar studies and made their own conclusions concerning necessary maritime domain awareness tasks or gaps. An interagency solutions analysis working group will join forces with two of the major efforts—the Department of Defense MDA Joint Integration Concept and the Navy's MDA Capabilities-Based Assessment—thus avoiding duplication of effort while adding more resources and brainpower to the interagency team.

Recommending Solutions

There is sometimes a tendency in the MDA community to consider technology first when looking to improve awareness. While technology can certainly bring about improvements, it is not always the most efficient way to solve a problem. Often changes in law, regulations, policy, or even an organization's operating procedure can reduce or eliminate gaps without the need for more technology.

The Interagency Solutions Analysis working group will consider non-material solutions (changes in policy or procedures) as well as material solutions (new capability that must be bought or developed). The difficult part will come next—determining which agencies or organizations should be responsible to bring about the necessary changes, and estimating the cost of these improvements for budgetary planning purposes.

Strategic Planning

Almost all of our federal maritime domain awareness stakeholders have different strategic and investment planning requirements. The Department of Defense has what is probably the most robust requirements-to-budget system—the Joint Capabilities Integration and Development System (JCIDS). In the absence of a formal interagency process to determine solutions to MDA gaps and present them to the respective agencies or departments, the interagency solutions analysis working group will utilize a JCIDS-like process for its planning documentation baseline.

The process will be modified as necessary, however, to capture agency-specific requirements so the collaborative effort can be supported by all. At the same time the analysis is being conducted, there will be an ongoing process of updating the MDA Stakeholder Board and all major partners to ensure that all involved understand the process and there are no surprises when recommendations for funding are made.

Study Process

The process will begin by defining the scope of the analysis. The team must determine how much MDA is

PO 3rd Class Patrick Cassidy aboard the Coast Guard Cutter *Gallatin* near Guantanamo Bay, Cuba. USCG photo by PO 1st Class NyxoLyno Cangemi.

"enough" in each of the primary focus areas. Without imposing some reasonable limits, recommended solutions might easily prove to be "pie in the sky" and therefore not achievable in today's budgetary climate.

Critical gaps identified by the interagency solutions analysis and other prior studies will be compared against existing doctrine and policy. The processes or capabilities required will not always require new technologies. Modifying regulations, breaking down illogical barriers between organizations, or re-orienting methods of doing business can result in dramatic improvements in information flow.

Since the solutions will outstrip the capacity of any one government agency, planners anticipate that resolution will require coordinated efforts among federal government entities, local port authorities, and other maritime industry stakeholders. Subject matter experts will develop a range of collaborative solutions and establish measures of effectiveness to rank them.

Looking Ahead

The Interagency Solutions Analysis team will present its first round of recommendations in late 2010. These findings will include the validated list of critical maritime domain awareness gaps, the best potential solutions to several high-priority gaps, cost estimates, and the recommended lead department or agency to tackle the issue. Time will be allowed for feedback from all stakeholders. Then the report will be presented to the involved departments and, ultimately, the Maritime Security Interagency Policy Council.

While its initial report addressing high-priority gaps is under review, the IASA team will move forward in a continual process to uncover and address MDA gaps.

These results will not be easy to come by. Reasonable professionals often disagree on how to pursue issues of this nature, and recommending and planning for spending that spans multiple organizations over a multi-year time period is a daunting task.

The primary measure of success of the MDA interagency solutions analysis should be the development of implementable cross-agency solutions that will mitigate or solve the identified critical MDA tasks and related capability gaps. The current cooperation among these partners portends well for a successful venture.

About the author:

Mr. Blaney is a retired Coast Guard Captain who commanded three cutters and headed the National Search and Rescue School during his active duty career. Following a period training merchant mariners, he returned to Coast Guard headquarters as a civilian, where he has been a member of the Coast Guard's MDA staff since 2003.

Interagency Information Sharing

Transforming MDA Capabilities

Coast Guard collaboration to meet information sharing objectives.

by LCDR Craig Wennet
Project Officer
U.S. Coast Guard Maritime Domain Awareness and Information Sharing

One of the 9/11 Commission's major findings was the need to improve sharing terrorism-related information within and across government lines. This spurred significant action on the part of the president, Congress, and across the intelligence and law enforcement communities to transform information sharing into an all-encompassing environment where the exchange of information is the rule, not the exception: To shift from the "need to know" construct toward a "responsibility to provide" paradigm. In addition to other efforts and legislation, the Intelligence Reform and Terrorism Prevention Act of 2004 (IRTPA) ensured that the Department of Homeland Security (DHS) would have a central role in the information sharing environment.

The Coast Guard, as the largest DHS component and a member of the intelligence community, possesses a unique role in federal information sharing efforts.[1] As RADM Brian Salerno recently testified to Congress, "The Coast Guard is the lead federal agency for maritime transportation safety, law enforcement, and environmental stewardship, and it has a broad set of responsibilities and authorities. This gives us a unique leadership role in helping to coordinate maritime governance across a very broad set of government, commercial, and private stakeholders, both domestically and internationally."

Coast Guard Information Sharing Initiatives

Since 2007, the Coast Guard's Information Sharing Executive Agent (ISEA) staff has visited Coast Guard sectors and subordinate units. Staff members speak with sector personnel and their port partners about their working relationships in maritime safety and security and gather information about the current state of information sharing and joint operations.

These visits have multiple purposes, including:

- documenting Coast Guard compliance with the federal laws and executive mandates regarding information sharing;
- preparing for the annual DHS report to Congress on information sharing performance measures;
- responding to DHS and other executive and congressional inquiries on Coast Guard information sharing practices;
- supporting programs related to port safety and security and Coast Guard participation in the International Trade Data System, the DHS Information Sharing Segment Architecture, and the Coast Guard Enterprise Architecture.

Visits are planned in coordination with several key Coast Guard and DHS stakeholders, including Customs and Border Protection (CBP) and Immigrations and Customs Enforcement (ICE). We interview a variety of partners at the federal, state, local, public, private, and occasionally international levels to gather tangible examples of information sharing best practices and recommendations for improvement.

General Findings

Primary sector collaboration venues include Area Maritime Security Committees, harbor safety committees, and numerous other public or private committees or associations. In every port visited, the Coast Guard also plays a chairing or moderating role in local law enforcement or first responder associations, and is often the glue that holds them together, even when it is not the primary response or enforcement agency.

Since commencing our interviews in 2007, a consistent trend toward increased collaborative planning, joint operations, and joint training among the Coast Guard and its numerous partners has been apparent. Although partners mainly attributed improved information sharing to the actions of their respective captains of the port, the similarity of responses from geographically distant ports was indicative of a deliberate agency-wide shift toward strengthening partnerships among Coast Guard stakeholders and throughout DHS.

The Neptune Coalition, for example, is comprised of about 20 federal, state, and local law enforcement and response agencies operating in the San Francisco Bay area and is facilitated by Coast Guard Sector San Francisco. Coalition members meet regularly, share operational information, and call upon each other for coverage or backup during incidents. Numerous respondents cited the Neptune Coalition as a major information sharing success story and effective best practice in the area.

We have been able to ascertain that a high degree of coordination and integration among the Coast Guard, CBP, and ICE is now common across the ports. This trend was not unexpected, since it reflects the many joint operational initiatives directed by the Coast Guard Commandant, the CBP Commissioner, and the ICE Assistant Secretary.

Partner Recommendations

Additionally, respondents shared concerns and provided many recommendations for improving operational collaboration and information sharing. Examples include:

- Meeting and exercise requirements: Most sectors and their partners are straining under statutory mandates for meetings, conferences, and training exercises. All parties are attempting to mitigate this burden by overlapping meetings when possible or exploring how to meet more than one requirement per exercise.
- Reporting protocols: Tactical partners at all levels use different reporting methods for different types of information. Common standards and protocols would improve efficiency.
- Sharing classified information: Federal classification and security rules are often a barrier in releasing information to non-federal partners. Likewise, there are still differences within federal agency clearance practices.
- Regulatory and policy interpretation: Industry partners conducting business in multiple ports note local variations in interpreting regulations, and would like to see nationwide consistency improved.
- Technological capabilities and integration: Many ideas and solutions were recommended, such as "blue force tracking" by automatic identification system or global positioning system for all federal, state, and local partner marine assets; improved commercially available geographic information system capability and compatibility; and shared emergency notification capabilities.
- Radio and network capabilities: Many partners reported concerns about the lack of shared capabilities and interoperability. While this is often locally overcome by sharing handheld radios, many partners seek more effective and efficient solutions.
- Partner collocation: Partners assert that the collocation of federal, state, and local operational personnel and assets regularly deployed on Coast Guard operations should improve information sharing and operational effectiveness.

Next Steps

DHS published its information sharing strategy in July 2008, and the ISEA staff plans to introduce an information sharing strategy for the Coast Guard, incorporating what we have learned through visits and interviews with port partners.

One of the ISEA staff's most important and urgent goals is to make the best practices and recommenda-

Best Practices

One of the goals of the annual port interagency information sharing interviews is to document best practices that other Coast Guard sectors as well as DHS components may wish to adopt. A small sample of the specific trends and practices we documented include:

Collaboration, Planning, Briefings, Meetings, and Training

- The captain of the port is essentially the "ambassador" for the Coast Guard and plays a key personal role in developing, maintaining, and improving collaboration with partners, who specifically notice and refer to the captain's personal involvement and guidance. By personally attending meetings and events, and maintaining an open door with government partners and industry executives, the COTP sets the stage for collaboration success in the sector.
- Collaboration programs such as "industry days," industry outreach strategies, and government affairs programs
- A "partner capability matrix" to identify and track available assets, communications capabilities, and personnel skills for incident planning
- Partnering with local marine exchanges to keep port information current
- Including partners in sector commander briefings
- Collocation with other agencies: Partners consistently report that face-to-face interaction is always more effective than other means. Collocation with the Coast Guard sectors was most often observed with CBP, but other federal and state partners often report interest in collocation. Sectors and partners make up for lack of geo-proximity via liaison assignments, and all of the sectors visited to date have designated personnel assigned to federal task force units.
- Training exchanges and cross-training opportunities: Several sectors participate in joint training programs with other federal agencies, with state and local government partners, and with public and private organizations such as port authorities and pilots' associations. Government and industry partners often reported being invited to Coast Guard-sponsored training.

Coordination of Port Safety and Security Information

- The Coast Guard sectors are continuing to improve their coordination of vessel boardings and cargo examinations with federal partners on a regular basis in many ports.
- Coast Guard personnel commonly host or participate in meetings with state and local law enforcement and regulatory agencies in established forums to share ports and waterways information resources and collaborate with the DHS-funded state and local fusion centers.
- Joint boardings, operations, and patrols are very common across all ports. Federal, state, and local partners attempt to optimize each other's capabilities, particularly in the current austere funding environment.
- Joint incident action planning and port restoral planning are now well-established practices in critical ports.

Senior Leadership Strategic Planning, Policy, and Agreements

- Federal/state agreements: Several sectors, with district facilitation, have developed memoranda of agreement with state partners for maritime security zone enforcement.
- Sector commanders participate in many executive-level associations, meetings, forums, and working groups to maintain joint communications with their peers and the community they serve. Some of these venues are found nationally, such as the Joint Terrorism Task Force executive boards, but in every port we visited there were also local public/private executive groups, such as Baltimore's Federal Advisory Quality Working Group, which adjudicates misunderstandings and seeks to improve relations among federal regulatory agencies and private industry.

tions we have collected more visible within the Coast Guard. For more information on Information Sharing Executive Agent staff initiatives or to review our annual reports, please visit our Homeport or CG Portal sites:

- https://homeport.uscg.mil/infosharing
- https://cgportal.uscg.mil/lotus/myquickr/uscg-information-sharing

We invite you to share your information sharing success stories or recommendations with us at uscginformationsharing@uscg.mil.

About the author:

LCDR Craig Wennet, MA, MBA, is a reserve officer on active duty on the information sharing staff. He has extensive information analysis and process consulting experience in both Coast Guard and private industry settings.

Endnote:

1. http://www.intelligence.gov/1-members.shtml

Transforming MDA Capabilities

Maritime Security

The National Maritime Intelligence Center.

by CAPT Paul Crissy
U.S. Coast Guard Reserve
National Maritime Intelligence Center Plans and Policy Staff

The National Maritime Intelligence Center (NMIC) traces its roots to the July 2004 9/11 Commission report that highlighted the need for better collaboration, integration, and data sharing across the intelligence community as well as more timely provision of actionable intelligence to decision makers. In its wake, the Intelligence Reform and Terrorism Prevention Act of 2004 authorized the newly named Director of National Intelligence to establish national intelligence centers to provide all-source analysis.

The Decision Advantage

The director established the National Maritime Intelligence Center on January 14, 2009, to coordinate the efforts and unique capabilities of the global maritime community of interest (GMCOI) with regard to information sharing. As a result, it is an integrated capability where the full spectrum of U.S. maritime intelligence requirements and all maritime security requirements, including military, criminal, economic, and national sovereignty issues, threats, and opportunities, are considered in aggregate.

The NMIC's goal is to create a "decision advantage" that confronts motivated, adaptive, and determined adversaries representing the full spectrum of legitimate and illicit entities. As a national intelligence center, the NMIC focuses on threats and activities including:

Illicit activities. The maritime domain facilitates a unique freedom of movement and flow of goods enabling people, cargo, and conveyances to transit with anonymity not generally available by movement over land or by air. It is particularly susceptible to exploitation and disruption due to its largely ungoverned nature and immense size. There are opportunities for misuse by terrorists, pirates, drug and human traffickers, undocumented migrants, and other criminals and individuals who can blend in with routine activities to become not "needles in a haystack," but rather "needles in a *needle* stack."

Gaps and seams. Motivated and adaptive adversaries constantly probe the maritime domain to identify and exploit weaknesses. For example, a dynamic land-sea interface, where threats transition between maritime and land domains, creates a potential vulnerability if essential and accurate intelligence is not efficiently relayed among responsible entities in a timely manner.

Asymmetric threats. Within the maritime domain, irregular challenges originate from highly adaptive adversaries employing unconventional methods to counter the traditional advantages of stronger opponents. Catastrophic challenges involve the acquisition, possession, and use of weapons of mass destruction or methods producing similar effects. Disruptive challenges can come from adversaries who develop and use technologies that unexpectedly make critical capabilities obsolete or ineffectual.

Disruption of the global supply chain. Disruption of the marine transportation system would have damaging effects on the integrity of the global supply chain, and interruption of seaport activity would have a devastating ripple effect throughout the world economy.

Climatology. Global climate change presents a new type of national security challenge. The suggested effects of climate change over the coming decades include extreme weather events, drought, flooding, rising sea level, retreating glaciers, habitat shifts, and the increased spread of life-threatening diseases.

Critical infrastructure interruption. The oceans provide shelter for many components of the world's critical infrastructure such as energy, pipelines, communications networks, and other information technology. Interruption of this critical infrastructure would affect the world economy.

Environmental destruction. Intentional acts that result in environmental disasters can have far-reaching negative effects on the economic viability and political stability of a region. Additionally, in recent years, competition for declining marine resources has resulted in a number of violent confrontations as some of the world's fishers resort to unlawful activity. These actions have the potential to cause conflict and regional instability. Similarly, massive pollution of the oceans, whether caused by terrorists or individuals who undertake intentional acts in wanton disregard for the consequences, could result in significant damage to ecosystems.

Safety, security, and stewardship of the maritime environment. There is a need for an integrated national policy and governance structure to coordinate ocean-related issues across the federal government.

Synergistic Efforts

The key functions of the NMIC are coordinating and integrating maritime information and intelligence collection and analysis in support of national policy and decision makers, supporting maritime domain awareness objectives, and supporting interagency maritime requirements at all levels. Ideally the center is a catalyst, encouraging other stakeholders to nurture mutually beneficial relationships.

The National Maritime Intelligence Center staff addresses priority national maritime intelligence interests and needs, identifies collection and analysis gaps, coordinates and integrates community of interest activities, and facilitates information sharing. The NMIC does not encompass or subsume existing organizations, but rather encourages, facilitates, coordinates, and integrates the existing capabilities of maritime stakeholders to achieve the most effective and efficient outcomes involving maritime security interests. Its four functional areas and representative initiatives are:

- Collection integration: to address collection resources and capabilities within the maritime domain; identify collection gaps and seams; develop coordinated, multi-discipline collection strategies to close those gaps and seams; identify priority national-level collection requirements; and assess success in closing collection gaps and seams.
- Analysis integration: to assess the state of analysis within the maritime domain; ensure coordination of intelligence analysis support to the Maritime Operational Threat Response plan and connectivity with maritime operational command centers; improve analysis through extensive community collaboration and enhanced information sharing; identify analytic gaps and seams related to customer maritime intelligence requirements; initiate efforts to close systemic gaps and seams; coordinate long-range studies; and establish strategic maritime intelligence performance metrics.
- Architecture: to support the rapid exchange of information necessary to meet maritime intelligence requirements.
- Information management and sharing: to lead the outreach program; review interagency, international, and industry policies to identify impediments and recommend solutions; recommend processes for enhanced information sharing; coordinate information technology and architecture efforts; provide leadership in the MDA vessel information hub; and participate in the people, cargo, infrastructure, and architecture hubs.

The Way Ahead

To ensure robust dialogue from stakeholders and ensure the greatest return on investment, the Director of the National Maritime Intelligence Center will continue to aggressively engage the GMCOI. Temporary and standing working groups and communities of interest such as the NMIC interagency working group, the mar-

Cause for Action

Security and prosperity depend upon sea-lines of communication, marine resources, and national capabilities.

- **Global economy.** More than 95 percent of international trade involves the maritime domain. The marine transportation system contributes to economic growth, enhances global competitiveness, and supports national and international security objectives.
- **Conveyances, cargo, and people worldwide.** The world trading fleet includes more than 184,000 ships larger than 100 gross tons. Currently more than 971 million tons of non-bulk cargo moves worldwide in more than 20 million containers that make over 354 million moves each year, and this volume is expected to double in the next decade. Over a million seafarers serve aboard merchant ships worldwide.
- **Conveyances, cargo, and people arriving in the United States.** More than 95 percent of all U.S.-bound international commerce flows through more than 300 deep-draft ports. Nearly 700 ships larger than 300 gross tons arrive in U.S. ports daily. Eight thousand foreign-flagged ships manned by 200,000 international mariners enter U.S. ports annually. More than 86,000 container-laden ships and nearly 9 million cruise ship passengers are screened annually.
- **Conveyances, cargo, and people exiting the United States.** National security, foreign policy, and economic objectives are maintained by ensuring an effective export control and treaty compliance system.
- **Global energy requirements.** Worldwide supplies of petroleum and natural gas resources depend on deep-water and coastal routes for access to the distribution infrastructure, as nearly 90 percent of the coal, 89 percent of crude oils, and 82 percent of liquefied natural gas move by sea.
- **Expanding capabilities of international navies.** Many nations are developing naval forces to protect their national sovereignty and strengthen their regional and international influence.
- **Protection of natural resources.** The U.S. outer continental shelf covers 1.76 billion acres and contains significant mineral resources, currently accounting for about 15 percent of U.S. domestic natural gas production and about 27 percent of domestic oil production. The U.S. exclusive economic zone, extending 200 nautical miles from the coast, contains significant living marine resources that require management and protection. U.S. interests in the Arctic represent significant possibilities that are still being estimated.
- **Environmental impact.** Trade routes and maritime activities are affected by weather, currents, and storms. The United States has broad and fundamental national security interests in the Arctic region and must be prepared to safeguard national security and sovereignty, access to resources, and freedom of the seas, as climate changes may affect access to this region.
- **Economic impact.** One of every six jobs in the United States is marine-related and over one-third of the U.S. gross national product originates in coastal areas. Annually, U.S. ports handle more than $700 billion in merchandise, while the cruise industry and its passengers account for $35.7 billion in economic output.

All statistics courtesy of the National Maritime Intelligence Center.

itime threat working group, and the interagency advisory group have been created to advise the NMIC director and bring together expertise from the intelligence community, the interagency and international communities, and industry to address matters of shared concern in the maritime domain.

Additionally, the NMIC will identify and leverage existing resources and capabilities, addressing national maritime security intelligence and information sharing requirements to weave the fabric of maritime security without creating duplicative functions. The NMIC will also bring together maritime operators, intelligence personnel, law enforcement personnel, regulatory personnel, industry leaders, scientists, academicians, and others to explore and inform stakeholders on current and emerging global maritime challenges. The April 2009 piracy conference hosted jointly by the NMIC, the National Intelligence Council, and the Office of Naval Intelligence brought together hundreds of representatives from 20 countries, the interagency, industry, and academia.

What to Expect From Your NMIC

Understanding why something is happening is as important as knowing what is happening. The National

Maritime Intelligence Center exists to integrate global intelligence regarding the location, identity, and operational capabilities and intentions of potential threats to U.S. interests. NMIC's intelligence coordination and leadership enhances MDA by identifying complementary knowledge that more fully explains maritime activities and future requirements.

Maritime domain awareness has become far more complex and difficult as the character of threats has changed from military forces, to nation-states, to criminals or terrorists. For example, linking financial transactions or suspicious activities ashore to movement of illicit or unknown materials aboard a legitimate ship movement may be used to trigger intercept of a specific container hidden among thousands of others aboard a foreign-flagged vessel in international waters. The NMIC will facilitate this analysis and serve as a catalyst to share the critical intelligence needed to thwart these kinds of illicit activities.


The National Maritime Intelligence Center (NMIC) is located in Suitland, Md., and co-located with the Office of Naval Intelligence (ONI) and the Coast Guard Intelligence Coordination Center (ICC). Photo courtesy of NMIC.

We May Not Know What We Know

The U.S. has tremendous intelligence resources and capabilities dispersed among many organizations and state, local, and tribal entities. Unfortunately, total asset visibility may not be clear. The daunting task remains to identify all collection and analysis capabilities and leverage them.

Along these same lines, better knowledge of what is available may enable us to more wisely invest in those resources and capabilities that we truly need to enhance maritime domain awareness.

All enterprises rely on some form of intelligence to maintain a competitive edge. The National Maritime Intelligence Center will help policy makers better understand short-, medium-, and long-term requirements to ensure that national security investments yield the best possible return in terms of the capabilities needed to protect our citizens.

Accurate knowledge of the maritime domain, significantly enhanced through the NMIC, will benefit all concerned stakeholders in conducting their activities more effectively and efficiently in an increasingly demanding environment.

About the author:

CAPT Paul Crissy has been assigned to the NMIC since its inception and is developing plans and policy for the organization. He previously served at the Office of the Director of National Intelligence and focused on implementation of the Global Maritime Intelligence Integration Plan.

Transforming MDA Capabilities

Maritime Domain Awareness Information Hubs

What are they, and what do they do?

by Ms. Alice F. Dunn
Program Analyst
U.S. Coast Guard Maritime Domain Awareness and Information Sharing

Achieving maritime domain awareness is a daunting challenge, to say the least, especially in view of the vast community of stakeholders. To better connect to this global maritime community of interest—or even to find out who they are—the National Concept of Operations for Maritime Domain Awareness called for creating "enterprise hubs" focused on people, cargo, vessels, critical infrastructure, and architecture.

Since then, two distinctly different types of enterprise hubs have emerged:

- MDA Information Hub: an MDA enterprise hub focusing on a specific MDA "pillar," identified as cargo, people, infrastructure, and vessel.

The MDA people information hub will coordinate with the many parties who screen passengers and crew. U.S. Coast Guard Photo.

- MDA Architecture Management Hub: assists the federal information sharing environment for the global maritime community of interest (GMCOI) by establishing national data and infrastructure standards and capabilities.

What is the Current Status of the MDA Hubs?
To date, four MDA information hubs have been established, one for each pillar or domain. These hubs identify key partners, inventory information resources, and respond to GMCOI inquiries. Meanwhile, the architecture management hub has begun formulating the architecture, processes, and standards that will ultimately facilitate information sharing.

What Are the Responsibilities for Each of the Hubs?
MDA Cargo and People Hubs: U.S. Customs and Border Protection (CBP) has been designated to lead the cargo and people hubs because it is the lead federal agency responsible for admissibility decisions regarding all international cargo and travelers. CBP is very familiar with and has access to data pertaining to the maritime supply chain, as well as international maritime crew and passengers.

Additionally, CBP has a long history of establishing cooperative data sharing agreements with other agencies having requirements for collecting maritime supply chain data, and supports an extensive consortium of federal partners in the international trade data system trusted community.

Analytical tools—such as the International Trade Data System/Automated Commercial Environment and other systems—are used to identify and respond to threats within the supply chain, and the national targeting center makes CBP uniquely equipped to support hub services.

MDA Infrastructure Protection Hub: The Department of Homeland Security's Office of Infrastructure Protection leads the coordinated national program to reduce and mitigate risk within the national critical infrastructure and key resource sectors to strengthen sectors' ability to respond and quickly recover from an attack or other emergency.

MDA Vessel Hub: The Office of Naval Intelligence and the Coast Guard Intelligence Coordination Center are the lead agencies, established to increase the awareness, availability, quantity, and quality of maritime vessel information. Collocated with the National Maritime Intelligence Center, the MDA Vessel Hub has an expansive plan of action, including serving as a forum where vessel hub stakeholders collaborate to address issues related to maritime vessel operations around the globe.

The vessel hub has responsibilities such as:

- near-real-time vessel identification and tracking, to the extent that vessels conducting potentially threatening anomalous behaviors are detected in advance of event escalation;
- near-real-time identification and tracking of vessels involved in non-threatening but illegal shipping operations;
- near-real-time identification and tracking of uncooperative, non-emitting vessels, particularly smaller vessels less than 300 gross tons.

Architecture Management Hub: The Department of the Navy Chief Information Office is the designated lead agency. The hub was established to design and manage the overall enterprise architecture needed to facilitate net-centric sharing of maritime information. The MDA enterprise architecture will provide the standards and processes that will allow the information hubs as well as any other maritime community member to share information and services.

About the author:
Ms. Dunn is a program analyst for the MDA information sharing staff. Her previous assignments include the Nationwide Automatic Identification System Program in the Office of C4 and Sensors Capabilities.

FOR MORE INFORMATION:

The National Maritime Domain Awareness Coordination Office has recently made available a single source for Maritime Domain Awareness information: www.mda.gov or http://63.97.107.75/.

This Web portal, developed through interagency effort, provides access to Maritime Domain Awareness-related information via four hubs:

- **vessels,**
- **cargo,**
- **people,**
- **infrastructure.**

Links to these hubs and additional Maritime Domain Awareness information are on the new website.

The MDA vessel information hub will inventory global stakeholders and resources regarding vessel histories, ownership, and operations. Photo courtesy of Louis Vest, Houston Pilots Association.

Transforming MDA Through Technology

AIS Data Sharing

A tool of diplomacy.

by CDR Fran Cloe, USN
Outreach Officer
National MDA Coordination Office Executive Secretariat

> "The security, prosperity, and vital interests of the United States are increasingly coupled to those of other nations. Our nation's interests are best served by fostering a peaceful global system comprised of interdependent networks of trade, finance, information, law, people, and governance."
>
> -A Cooperative Strategy for 21st Century Seapower, October 2007

Since publishing "A Cooperative Strategy for 21st Century Seapower," in which the Commandant of the Coast Guard, the Chief of Naval Operations, and the Commandant of the Marine Corps came together to create the first unified maritime strategy, all three seagoing forces have prioritized international engagement at a level unseen in recent decades.

One of the primary means of engagement with other nations, especially as the United States has increased its focus on maritime domain awareness (MDA), is maritime data sharing. While a variety of efforts exist, from the U.S. Maritime Safety and Security Information System (MSSIS) to Italy's Virtual Regional Maritime Traffic Center, unclassified data sharing has brought the world's maritime states closer to the goal of achieving global MDA.

Bringing together politically, culturally, and financially disparate maritime nations to share maritime data requires a technology that is both flexible and universal—a simple tool that will help build trust and cooperation among all maritime nations. The Automatic Identification System (AIS) is such a tool. AIS is a shipboard system that transmits information such as vessel name, registration number, call sign, Maritime Mobile Service Identity (MMSI), position, course, speed, and other navigational information via VHF.[1]

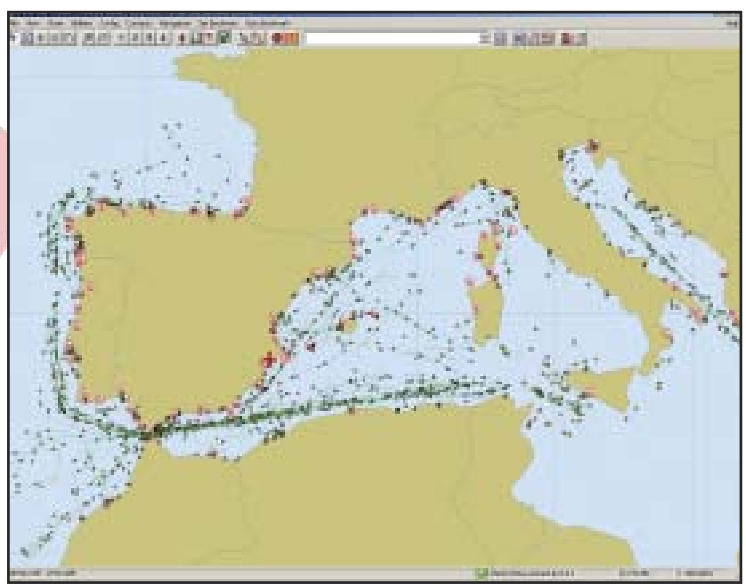


Figure 1: A view of the AIS feeds from the Western Mediterranean members of the Maritime Safety and Security Information System. Photo courtesy of the NMCO Executive Secretariat.

AIS Data Sharing Is Simple

AIS data is non-classified and can be obtained and shared through inexpensive, off-the-shelf technology. A nation may join an AIS network by contributing the AIS data received by a single antenna and receiver or data from its entire coastal network via the Internet. Several international AIS-sharing networks are already in operation. In most circumstances, a new member can connect to a chosen network with simple written instructions or remote technical assistance.

Figure 2: A Google Earth overlay of the Maritime Safety and Security Information System with a ship highlight. Photo courtesy of the Volpe Center.

The Maritime Safety and Security Information System, developed by the U.S. government, displays a global picture of AIS data with the ability to select geographic regions (Figure 1) and individual ships (Figure 2) to extract the related data.

Originally created by the Volpe National Transportation Systems Center at the U.S. Department of Transportation's Research and Innovative Technology Administration, MSSIS is based on Volpe's work addressing regional maritime traffic issues in the Panama Canal and the Saint Lawrence Seaway. Using downloadable user interface software called "TV32," MSSIS allows real-time sharing of non-classified Automatic Identification System data among international government users through an Internet-based, password-protected exchange portal. It displays AIS data streams gathered from shore-based, waterborne, and airborne Automatic Identification System receiving units in a global view.

The data is, by design, not owned or controlled by any entity and is "raw" data: unaltered, unstored, and unfiltered, although it is "thinned" in order to avoid multiple displays of the same ship. Originally used in Europe by the U.S. Navy and NATO, there are now more than 60 member states sharing AIS data through MSSIS.[2]

AIS Data Sharing Is Universal

Automatic Identification System transceivers and antennas can be easily obtained from marine stores or manufacturers worldwide. With a minimal investment from several hundred to several thousand dollars, even economically disadvantaged states are able to participate.

The networks available to share AIS data are diverse and often open to any government willing to share its own data. The International Association for Marine Aids to Navigation and Lighthouse Authorities (IALA), for instance, is developing IALA-NET, an independent option for sharing AIS data in support of maritime safety (Figures 3 and 4).[3]

The strength of IALA is that it is not associated with any one government. It also has recognized committees in place to facilitate creating global guidelines and protocols such as those it already facilitated and are

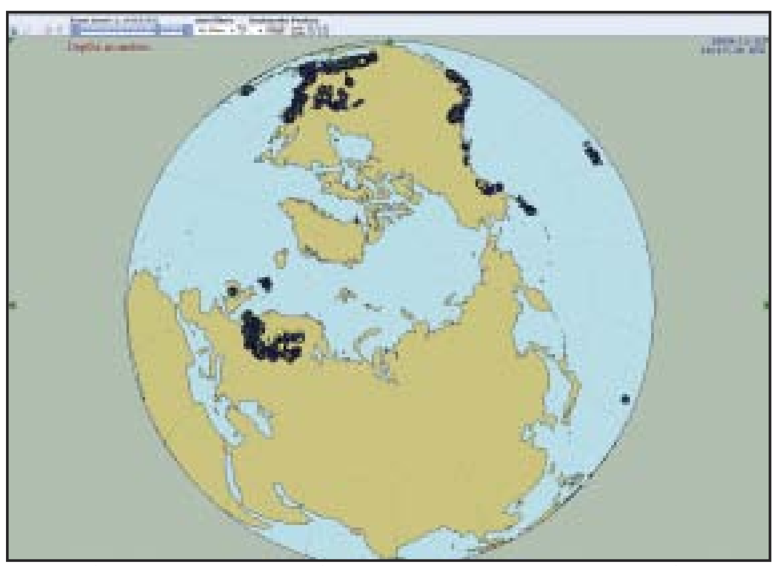


Figure 3: An Arctic view of IALA-NET. Feeds are visible from the U.S. nationwide AIS and the Baltic States' HELCOM network. Photo courtesy of the NMCO Executive Secretariat.

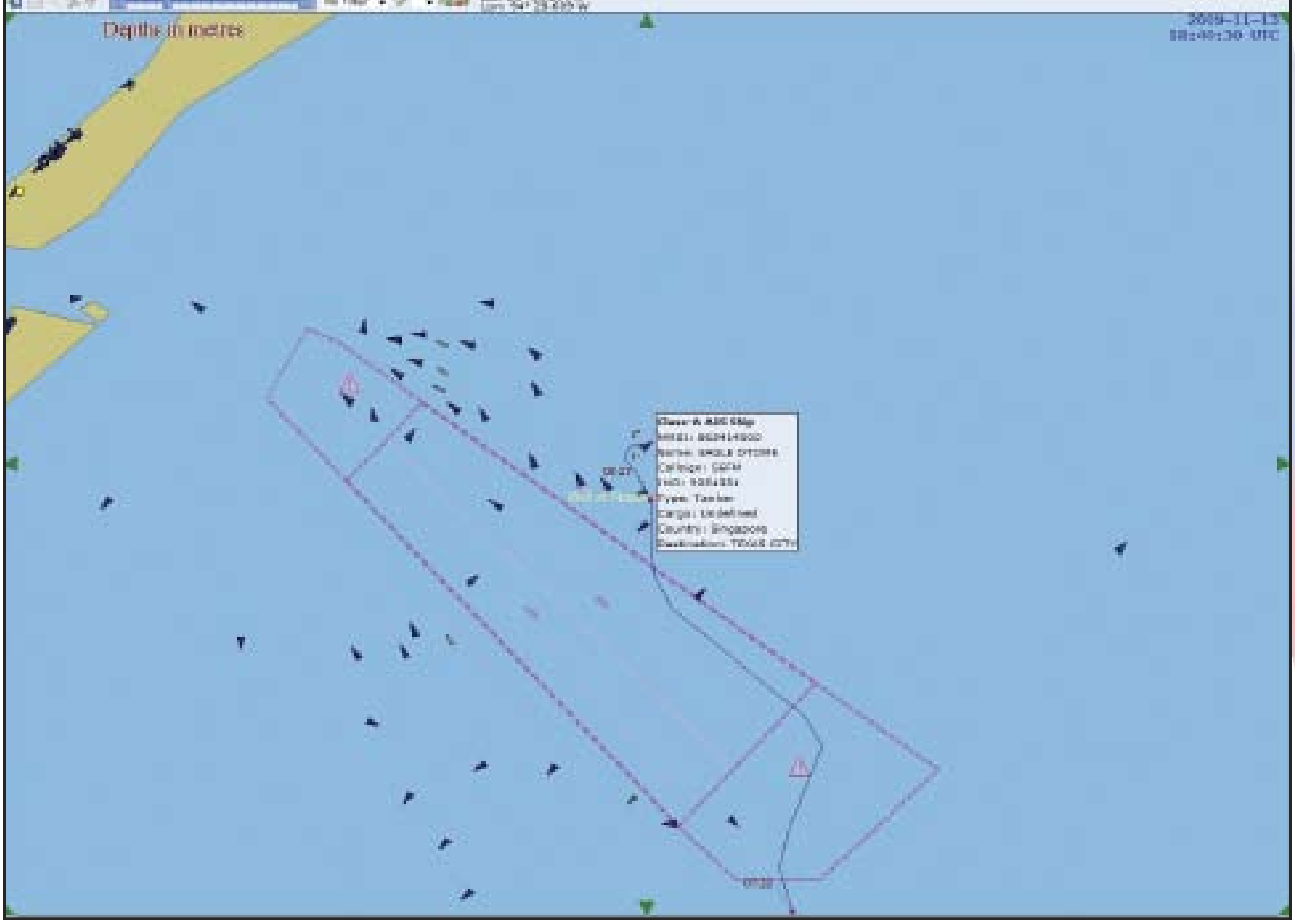


Figure 4: Detailed view of the Galveston area on IALA-NET with ship data and historical track displayed. Photo courtesy of the NMCO Executive Secretariat.

now the norm for AIS itself. IALA-NET has close to a dozen participating nations so far, including Denmark, Finland, Montenegro, Norway, Estonia, Australia, Poland, Ireland, Latvia, China and the United States, with more applications pending review.[4]

AIS Data Sharing Is Flexible

Governments choosing to join established networks such as MSSIS or IALA-NET need only contribute the data from one AIS receiver in order to receive all data contributed from other members. Many governments, however, choose to contribute multiple port cities, or their entire national network of receivers, in an effort to provide greater awareness.

This flexibility allows a minimal financial investment for members new to information sharing. Additionally, governments can then use the global AIS picture for whatever purpose is most relevant to their situations. For example, some nations may choose to store the data in order to prosecute polluters, while others use the live feed to identify illegal fishermen in territorial waters.

Taking AIS to the Next Level

One other advantage of Automatic Identification System networks comes when regional partners build more advanced information exchanges on the back of the raw data. Italy's Virtual Regional Maritime Traffic Center began as an exchange of AIS, radar, and satellite data among Italian law enforcement, customs, and military agencies. It quickly developed into a cost-effective forum in which over 20 nations known as the "wider Mediterranean community" now share knowledge to pool resources and build maritime domain awareness.[5]

The Western Hemisphere's Virtual Regional Maritime Traffic Center for the Americas (VRMTC-A) starts with the MSSIS feed and adds software agents and collaboration tools so users can correlate data, define alerts, and communicate time-critical information. Nations from the Americas and the Caribbean are working together to improve transparency in the region.

Singapore's Regional Maritime Information Exchange initially offered a regional maritime picture using AIS data, maritime reports, and news feeds. In 2009, the Singapore government added the Open and Analysed Shipping Information System, which receives shipping data from participating countries and maritime organizations for analysis and anomaly detection.

Limitations

Despite the success of recent initiatives, there are still several arguments against the effectiveness of Automatic Identification System data sharing. First, not all ships are required to carry AIS transceivers, and even ships that do carry the equipment can easily turn it off. However, this is balanced by the use of AIS as an anomaly detector. As an example, if a port authority receives radar returns from 10 ships, and pairs AIS data with eight of them, it can concentrate its resources on identifying the two that aren't using AIS.

Second, Automatic Identification System range is limited, and reception is usually no more than 25 miles. This is effective for coastal reception, but leaves the vast majority of shipping traffic out of range of the shore-based receivers. Both commercial and defense options exist to track this traffic via satellite or other means.

Third, AIS data sharing specifically encounters a proprietary barrier to sharing. Several maritime companies offer commercial AIS sharing for which they charge a monthly or annual fee. Legal issues may arise when a government offers the same data without fee or with a government subsidy. For this reason, MSSIS, IALA-NET, and VRMTC-A are currently restricted to sharing between governments—typically, the coast guards, military, and law enforcement agencies.

Finally, culture or history may challenge AIS data sharing. Nations that historically have not cooperated with each other often find it difficult to move beyond traditional attitudes of isolation and control of information. MSSIS has provided an international venue for maritime information sharing that has already broken down historical barriers among countries.

Looking Ahead

Global maritime information sharing is nearing the tipping point. While bilateral agreements remain important, "many-to-many" information sharing networks are overtaking them in value and importance.

De-centralized global grids, such as those that have facilitated the phenomenal growth of cellular phone service and availability of cash machines, tend to provide greater value to individual participants than can be provided by any single centralized hierarchal organization.

In the maritime community, AIS data sharing is gaining significant ground as a method by which to set the baseline for maritime information sharing. The simplicity, low cost, and accessibility of the system make it a diplomatic tool that allows nations to participate equally, and to derive real use for their specific needs.

As more maritime nations join AIS networks, they can begin to build more complex regional maritime exchanges, and ultimately, a global maritime exchange. The resulting increase in global MDA will build trust and cooperation among all maritime nations.

About the author:
CDR Fran Cloe has served in the U.S. Navy as an ES-3A pilot, a staff officer for the commander of U.S. Naval Forces South, a watch officer at the Navy Operations Center, and a Gulfstream pilot in the Navy Reserves. She is the Western Hemisphere Outreach Officer at the National MDA Coordination Office Executive Secretariat.

Endnotes:

1. The International Maritime Organization (IMO) mandated AIS under Regulation 19, Chapter V of the International Convention for the Safety of Life At Sea (SOLAS). The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages, and all passenger ships, irrespective of size. The requirement became effective for all ships by 31 December 2004. International Maritime Organization, International Convention for the Safety of Life at Sea (SOLAS), Chapter V, Regulation 19.2, Section 2.4, 12/13/2002.
2. Henry Wychorski, U.S. Department of Transportation, Volpe Center, 10/29/2009.
3. IALA is a non-profit, non-government maritime association comprised of more than 85 of the 160 IMO member nations in support of maritime navigation safety.
4. International Association of Marine Aids to Navigation and Lighthouse Authorities, "Presentation of IALA-NET," July 2008.
5. Marco Cresca, LCDR Italian Navy, V-RMTC: The Italian Navy's "Med-centric" Approach For Information Sharing in the Maritime Environment, 12/4/2008.

Figure 5: Petty Officer 2nd Class James Clea and Petty Officer 1st Class Ryan Jennings monitor the Automatic Identification System at Maritime Intelligence Fusion Center Atlantic. U.S. Coast Guard photo by Petty Officer 3rd Class Mark Jones.

Transforming MDA Through Technology

Civilian Earth Observation Satellites for Global Maritime Awareness

Effective? Affordable?

by Mr. Guy Thomas
Science and Technology Advisor
United States Coast Guard

National Security Presidential Directive-41/Homeland Security Presidential Directive-13 establishes U.S. policy for enhancing our national security and protecting our interests in the maritime domain. Specifically, it directs that maritime domain awareness efforts be undertaken:

"… to develop an enhanced capability to identify threats to the maritime domain as early and as distant from our shores as possible by integrating intelligence, surveillance, observation, and navigation systems into a common operating picture accessible throughout the United States government."

One of the main ways to accomplish this may well be to collaborate with our international partners to build a common operational picture on a global scale by combining terrestrial maritime surveillance systems with commercial and civilian space systems that have significant Earth and ocean observation capabilities. This capability would be in addition to any classified undertaking either now underway or planned and would have the benefit of being able to be shared with all seafaring nations.

Civilian earth observations satellites have been operating since the mid-1980s, but it is only in the past few years that the industry has expanded both in number and capability of the individual spacecraft. Even more capable systems are now being planned. However, with only a very few exceptions, no one is planning to take advantage of these systems for the global maritime awareness they could provide if operated collaboratively. Many of these systems have significant ocean surveillance capabilities, which—if bundled together and used intelligently—could provide the maritime nations of the world with a much better picture of who is sailing the seas, and provide indications of their intentions.

Earth Surveillance Satellites

One study reports that as of late 2006 there were 31 electro-optical and/or infrared (EO/IR) imaging systems in orbit (with an additional 27 planned) and four synthetic aperture radar satellites (SARSats) in orbit (with another nine planned).[1] Indeed, it was reported at the Earth Observation Business Network 2008 that, with the launch of Canada's RadarSat 2 in December 2007, there are now seven SAR satellites in orbit.[2]

The numbers and capabilities of both EO/IR and SAR satellites with oceanic surveillance capabilities are projected to grow substantially in the coming years. In addition, in the last two years almost a dozen different satellites have been launched with Automatic Identification System (AIS) receivers, and an AIS receiver has been installed on the International Space Station. Some of these are now in direct support of at least two different SAR satellites.

Indeed, it is the coupling of AIS via space with radar satellites, which can "see" in darkness and look through most cloud cover, and the new, higher-resolution imaging satellites that makes the concept known as "Collaboration in Space for International Global Maritime Awareness" or C-SIGMA feasible. These new civilian

continued on page 40

Types of Satellites and Various Technologies

Automatic Identification System

The Automatic Identification System (AIS) is an advanced navigation system developed and used by ships and vessel traffic systems for vessel traffic management and collision avoidance at sea. The International Maritime Organization's International Convention for the Safety of Life at Sea (SOLAS), 1974, requires it to be fitted aboard all ships of 300 gross tons or more.

The system can be interfaced with radar and electronic charts to provide information about ships in the vicinity for security and safe navigation. The Automatic Identification System signal as seen from space identifies the vessel and provides its location, course, and speed.

Collaboration in Space for International Global Maritime Awareness

The configuration of the C-SIGMA system is still under development, but the idea is similar to the International Civil Aviation Organization's mandated tracking of all commercial air traffic. Many different communications satellites have the capability of providing the required transponders, but not all have full oceanic coverage. Among those that do are the various InMarSat systems and the three low earth orbiting communications satellite systems—Global Star, Iridium, and OrbComm.

Communications Transponder System

These satellites link to a wide variety of asset location and status reporting beacons. Many of these reporting beacons are mounted on vessels of all sizes, and there are many such systems used in a wide variety of ways. The International Maritime Organization (IMO) has mandated the use of these systems for long-range identification and tracking.

Cosmo-Skymed

The Cosmo-Skymed satellites will provide monitoring, surveillance, and intelligence data for military customers. For commercial institutions, civilian institutions, and scientific communities, these satellites will provide environmental surveillance of floods, fires, landslides, and oil spills, as well as earth topographic mapping.[1]

Envisat SAR

Envisat is an Earth observation satellite that flies in a sun-synchronous polar orbit of about 800 km altitude. The repeat cycle of the reference orbit is 35 days, which provides complete coverage of the globe within one to three days.

By exploiting the combinations of polarizations and incidence angles, advanced synthetic aperture radar offers 37 different and mutually exclusive operating modes in high, medium, and reduced resolution. These modes will be operated mainly in response to user requests. Wave mode is also mutually exclusive with respect to all the other modes. It is a low-rate mode operated systematically over oceans as part of the global mission.

Global monitoring and wave modes are recorded systematically. High- and medium-resolution imaging modes are either transmitted on a real-time link or recorded on the onboard solid-state recorder for ground data recovery.[2]

EO/IR

Many electro-optic and infrared satellites have extraordinary imaging qualities, but their field of regard is very narrow. This is why they need a secondary system, such as the SARSats, to provide them with timely cueing information to allow the camera sensor to be programmed to take the image of the correct spot in the ocean. This is not an impossible feat, but timeliness of the entire system is very much at a premium. They are also significantly degraded by cloud cover.

Optical Imaging Satellite Systems

There are many different earth imaging systems in orbit today, and more planned. See "ASPRS Guide to Land Imaging Satellites" by W. E. Stoney of Mitretek Systems.[3] He notes that there are, as of late 2006, 31 electro-optic and infrared satellites in orbit, with an additional 27 planned, and there are four SARsats in orbit, with an additional nine planned.

Orfeo

The Orfeo is a dual-use (civilian and military) Earth observation satellite network developed jointly between France and Italy. The system consists of two satellites equipped with advanced electro-optical payloads, known as Pleiades, being developed by France, and four satellites equipped with synthetic aperture radar, known as Cosmo-Skymed, being developed by Italy.

SAR-Lupe

The SAR-Lupe system consists of five identical satellites, which will be launched in six-month intervals. It serves the German federal armed forces as a national reconnaissance system. With its high-resolution radar, SAR-Lupe provides a repetitive, worldwide reconnaissance capability.[4]

SARsat

Among the most sophisticated are the synthetic aperture radar satellites (SARSats). Each SAR satellite operates in a specific band, but not all operate in the same band. These satellites use speed and sophisticated processing algorithms to synthetically increase the size of the aperture of their radar, thereby increasing sensitivity.

All satellites of this class are capable of imaging the surface of the oceans. The most capable can determine what type of ship they are detecting, and others can track wakes from small vessels moving at high speed as well as large vessels moving at moderate speeds.

Most SARSats have a wide-area surveillance mode as well fine-grain detection modes. Some have a third, intermediate mode called "scan." At least one now has a fourth mode for very fine-grain imaging. SAR systems can be rapidly shifted from one mode to another. Timeliness is a weakness of nearly all satellite systems. Many people in countries ranging from Canada to Brazil to Germany to Italy to India are working to improve both speed and detail of signal processing on the downlinked radar signal to make the synthetic aperture radar sensor even more effective in a wide variety of roles.

Because each of these satellites are in an inclined orbit, as the latitude increases north and south away from the equator, the opportunity for surveillance increases. These systems are the imaging backbone of any space-based oceanic surveillance system.

TerraSAR

The TerraSAR system consists of two radar satellites that operate in different frequencies to complement each other. The mission has its origin in an industrial initiative to provide market-derived X- and L-band SAR products from a pair of spacecraft operating in tandem in a sun-synchronous orbit.

The new TerraSAR-X satellite will deliver Earth observation data for scientific, institutional, and commercial users. TerraSAR-X will be the first satellite realized in a public/private partnership in Germany, as EADS Astrium GmbH and the German Aerospace Centre (DLR) share the costs for construction and implementation of the satellite.[5]

Endnotes:

1. http://www.deagel.com/C3ISTAR-Satellites/COSMO-SkyMed_a000256001.aspx
2. http://envisat.esa.int/category/index.cfm?fcategoryid=61
3. http://www.asprs.org/news/satellites/
4. http://www.lsespace.com/missions/sarlupe.php
5. http://www.lsespace.com/missions/terrasar.php

space systems are not seen as replacing any existing terrestrial systems, such as the over-the-horizon radar or acoustic systems, but rather as a means to make those sorts of broad ocean surveillance systems significantly more effective. And, as noted, they have the added advantage of being basically unclassified systems.

Impediments and Answers

Across the centuries, mariners have come to take concealment from people on shore and their prying eyes for granted. Breaking that paradigm, which is an international mindset, may not be easy. Owners and operators of vessels of any significant size will need to adjust to the new paradigm of maritime transparency.

Additionally, the widespread belief that using satellite-based systems for persistent oceanic surveillance would take a significant, dedicated constellation of satellites, with each satellite costing many hundreds of millions (if not billions) of dollars, was a major detractor. The new space systems have put that notion in serious question.

The possibility of using civilian satellites for persistent oceanic surveillance has recently come much more sharply into focus, however, and was strengthened by the successful completion of a wide-ranging test from the Mediterranean to the East Coast of the United States in the fall of 2006 that used synthetic aperture radar satellites coupled with new high-resolution electro-optic and infrared imaging satellites. The experiment used terrestrial AIS to positively identify the detected vessels. Since that test the successful launch of satellites with Automatic Identification System receivers has further made the point that unclassified detection and tracking of vessels from space is a reality.

Rough Concept of Operations

To achieve maritime domain awareness goals, satellites could be used to openly survey the world's oceans to establish normal patterns of behavior for shipping and boating worldwide.

For example, the operational cycle of the system might begin with the tasking of one of a constellation of synthetic aperture radar satellites to collect the data from wide area search mode and then switch to a spotlight mode to refine the attributes of any targets. It might even be that a second SAR satellite will be tasked on the fly to conduct the more fine-grain surveillance before a third or fourth satellite, equipped with optical sensors operating in the visible or infrared or hyper-spectral bands, conducts a fourth or fifth or greater collect on the same target. Information from AIS collected via satellite would also be filtered into the analysis, working to identify the vessel and what other vessels are nearby.

Ship information compiled from unclassified sources and pertinent to the area under observation could also be scoured for supporting information, such as the long-range identification and tracking and terrestrial AIS reporting systems and/or other corroborating information gathered from other terrestrial unclassified sources.

If deemed appropriate, and weather permitting, a high-resolution EO/IR imaging satellite could be tasked to image the correct spot in the ocean. The image could be processed to further determine a ship's location, course, speed, and status.

If an image is not gained, then analysis will need to be conducted to understand why it was not. Has the ship in question altered course? Sped up? Slowed down? Is it behaving in a rational manner? In a suspicious manner?

A Look Ahead

Other sources and methods would need to be employed to gain further information, but the basic data would be provided by the envisioned, unclassified system. A civilian-based space broad ocean surveillance system such as the proposed C-SIGMA concept could provide the necessary surveillance for first-level indications as to whether a vessel was engaged in actions such as illegal fishing, environmentally harmful practices, smuggling, or just operating in a manner such that a closer examination might be warranted. Indeed, projects are underway to develop anomaly detection algorithms.

C-SIGMA is not a silver bullet, but it would be a huge help in establishing the envisioned transparency for all maritime nations. The dawn of unclassified open ocean surveillance has already occurred, and while these systems do not replace the national classified systems, their data can be shared with the many nations of the world. An international exploratory workshop is being considered this year to examine how such a concept might be enacted.

About the author:

Mr. Guy Thomas is the science and technology advisor for the United States Coast Guard and works closely with the National MDA Coordination Office Executive Secretariat, which works to execute the National Strategy for Maritime Security. He retired from the Navy, then from the Johns Hopkins University Applied Physics Laboratory. He conceived and led the initial installation of AIS on satellites and unmanned aerial vehicles.

Endnotes:

1. ASPRS Guide to Land Imaging Satellites, www.asprs.org/news/satellites.
2. See "www.satellite-business.com/about" for info on the 2010 conference.

Long-Range Identification and Tracking

Transforming MDA Through Technology

Observing maritime activity over the horizon.

by CDR Kevin Keast
Chief for Communications and Sensors
U.S. Coast Guard Office of C4 and Sensors Capabilities

Maritime domain awareness is obtained through numerous systems and programs. Many technical capabilities leverage the latest in C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) architecture to enhance maritime situational awareness, or what is commonly referred to as the maritime common operational picture.

Since 9/11, a gap has existed in our ability to observe maritime activity over the horizon. Programs like the Nationwide Automatic Identification System (NAIS)—a coastal network of receiver sites—detect NAIS transponder signals and track vessels in the coastal environment. However, once line-of-sight limitations are reached, other capabilities are required to look beyond.

The United States realized early on that this gap was part of a larger issue of global security, and communicated this need through international channels. The International Maritime Organization (IMO) was easily convinced that a long-range ship tracking capability was required, and instituted the Long-Range Identification and Tracking (LRIT) effort.

The LRIT System

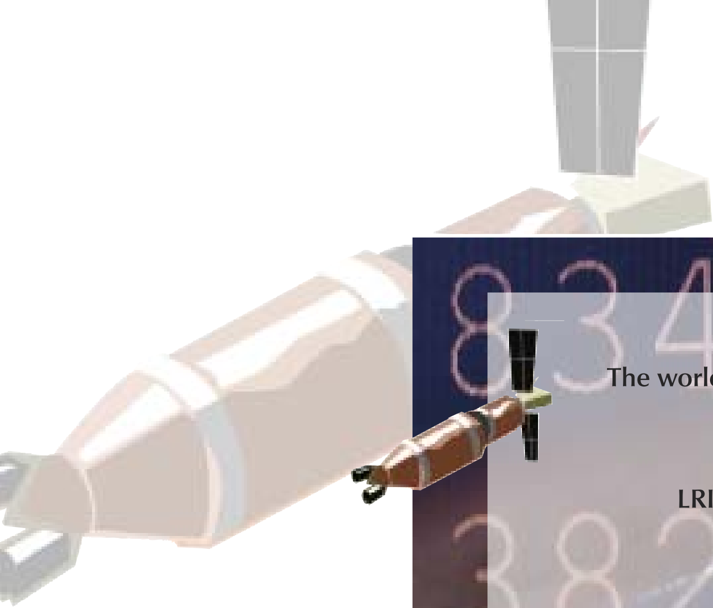
The Long-Range Identification and Tracking System is a designated International Maritime Organization system designed to collect and disseminate vessel position information received from IMO member state ships that are subject to the International Convention for the Safety of Life at Sea (SOLAS). Vessels on international voyages subject to the rule include cargo ships of 300 gross tons and greater, passenger vessels carrying more than 12 passengers, and self-propelled mobile offshore drilling units.

This system allows SOLAS contracting governments access to tracking information. For example, the U.S. receives worldwide tracking information from all U.S.-flagged SOLAS vessels, all foreign SOLAS class vessels inbound to U.S. ports, and access to LRIT information from foreign vessels transiting within 1,000 nautical miles of our coast.

Global Efforts

The Coast Guard developed the U.S. National Data Center in December 2008 to collect, request, receive, and distribute data within the LRIT system.

Additionally, the International Maritime Organization designated that the U.S. build and temporarily operate the International Data Exchange, which routes vessel positioning data among all participating LRIT data centers, through the end of 2011.



CAPABILITIES

The worldwide LRIT system became operational on December 31, 2008.

LRIT information is limited to use by contracting governments.

LRIT tracks more than 40,000 foreign flag SOLAS class vessels as they approach United States ports or pass within 1,000 nautical miles of the coast.

LRIT provides the U.S. Coast Guard with position information on all U.S. flag SOLAS vessels worldwide.

As of May 2010, there were 53 data centers representing more than 90 flag administrations in production.

The U.S. National Data Center tracks approximately 2,500 foreign flag vessels at any given time.

Since September 2009, the U.S. National Data Center has received more than 1.5 million foreign flag vessel position reports.

The Way Ahead

Although Long-Range Identification and Tracking is in its infancy, the United States is already obtaining thousands of ship position reports daily for over 3,000 reporting vessels. These numbers will continue to grow as all SOLAS vessels integrate into the LRIT system and data centers come online.

LRIT has been delivered to the Coast Guard as an open architecture system and is providing a tracking service that can be delivered easily across all United States government entities. While this tracking information is only available to the Coast Guard and the Department of Defense at present, the service will be extended to other government agencies to support a wide range of government requirements relating to maritime safety, security, and environmental protection.

About the author:
CDR Kevin Keast is a graduate of the U.S. Coast Guard Academy and holds a B.S. and an M.S. in electrical engineering. He has served several sea tours, including a tour as commanding officer of an 82-foot patrol boat. He has served at the USCG Research and Development Center and as chief of response at Coast Guard Sector Long Island Sound. CDR Keast is currently the division chief for Communications and Sensors for the Office of C4 and Sensors Capabilities.

Today's Data Sharing

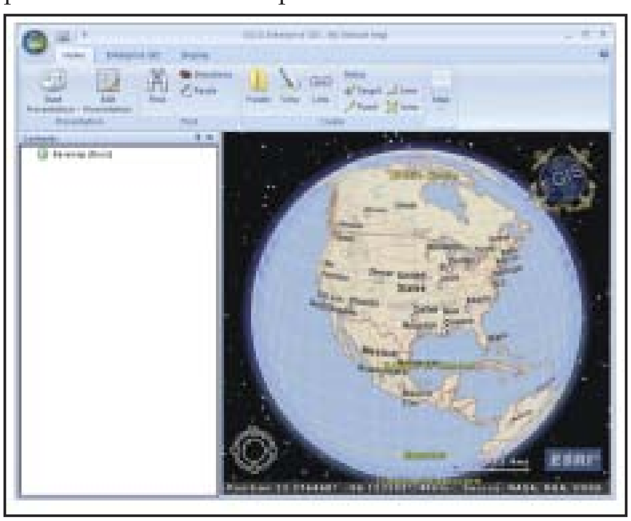
The Coast Guard's Enterprise Geographic Information System.

by Mr. Pete Noy
Information Technology Specialist
U.S. Coast Guard Operations Systems Management Division

CDR Joseph Sundland
Geospatial Management Officer
U.S. Coast Guard Office of Enterprise Architecture and Governance

The U.S. Coast Guard collects and generates large amounts of information related to the people, vessels, and facilities it interacts with daily, ranging from law enforcement actions, to search and rescue activities, environmental response activities, and vessel or facility inspections.

While the variety of information ranges as widely as Coast Guard mission areas, often there is a common thread—the information has a unique geospatial component. This location-specific information can be as general as a waterway or Coast Guard sector, or as specific as a facility's street address or a latitude and longitude for a location on the water. As a result, the information can be mapped for easier viewing and awareness.



The Coast Guard's Enterprise Geographic Information System. All graphics courtesy of USCG.

While the identification, collection, and storage of this large amount of information are challenges in themselves, sharing this information poses the real challenge. For this, the Coast Guard relies on a geographic information system (GIS), which is an integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes.

This provides a framework to gather and organize spatial data and related information so it can be analyzed. Simply put, it provides a way for a user to take data from a number of sources and generate a map that can be shared with other users.

USCG Enterprise Geographic Information System

The Coast Guard's Enterprise Geographic Information System (EGIS) arranges this information in a more user-friendly format, providing the user with a quick understanding of the information within the area of interest. The user is able to see the extent of a situation, such as an oil spill, and immediately identify Coast Guard assets for deployment.

The system can also display all SAR activities within a given sector and allow the user to access various Coast Guard systems of record to pull and spatially display this information. For example, by accessing all search and rescue cases currently stored within the Coast Guard's Marine Information for Safety and Law Enforcement (MISLE) system, a user can plot out where response activities have occurred and determine if existing small boat stations are placed in the appropriate location.

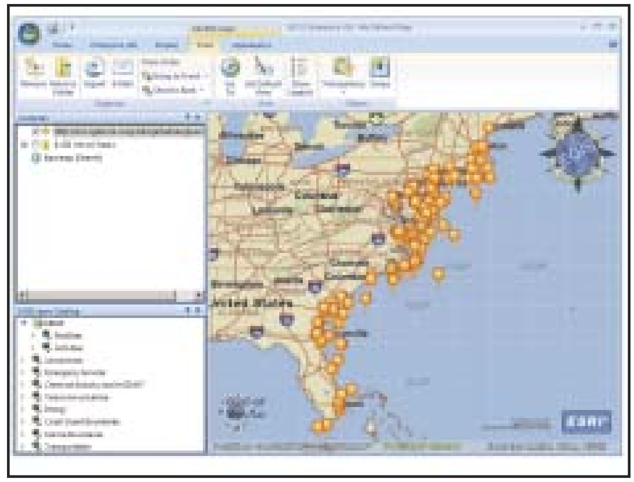
Initially, the Coast Guard's Enterprise GIS was developed to support MISLE by providing real-time graphic spatial display and editing capabilities for all MISLE activities and facilities while also supporting incident response in real time. This early version was dubbed MISLE GIS. It also functioned as a centralized common repository for GIS data for a variety of USCG program areas including the Nationwide Automatic Identification System, the Search and Rescue Optimal Planning System, and the Web-enabled Common Operational Picture application.

The MISLE GIS was developed to allow a user to take the 1.8 million data points stored within MISLE and view them on an aerial photograph, base map, or navigation chart. When this capability was initially utilized, it quickly became apparent that this spatial display capability could support users beyond the initial MISLE user base. The MISLE GIS expanded to its current Enterprise GIS name and was established as its own Coast Guard automated information system.

A key driver for the EGIS is the ability to ingest and share the large datasets held in the system and make them available to a broad range of users. For example, if a hurricane were forecast to impact an area, a user would be able to pull all facility information for a particular captain of the port and display this on a map. The user could then access the latest hurricane tracking information from the National Oceanic and Atmospheric Administration (NOAA) website and overlay it to determine which facilities could be impacted, and plan accordingly.

Data Sharing

Since the EGIS can share datasets within the Coast Guard and with external users, everyone can access the same information, which reduces duplication and potential errors.



The Coast Guard can share vessel data with NOAA.

In a recent functional example, NOAA requested a way to identify which vessels were transiting the endangered Right Whale breeding areas during certain times of the year. The EGIS was able to correlate NOAA and vessel movement identification data to determine the vessels of interest. Further, it can determine if vessels are exceeding established speed restrictions. The NOAA user can then display this mapped information on either a cell phone or local computer. The target vessel's tracking data is also saved and stored for future access.

Future Direction

At the time this article was written, the EGIS was undergoing a software rewrite to make it fully compliant with the current DHS Enterprise Architecture while offering a more positive and robust solution.

Additionally, other Coast Guard programs have begun evaluating ways to share their own unique datasets. As a result, the Coast Guard established a Geospatial Management Office at its headquarters with an eye toward consolidating geospatial technologies across all Coast Guard programs.

About the authors:

Mr. Pete Noy is an information technology specialist in the U.S. Coast Guard Operations Systems Management Division. He has been a Coast Guard civilian employee for the past four years and has worked in the GIS field for almost 20 years. He holds both a bachelor's and a master's degree in geography and environmental planning. Mr. Noy previously served in the Coast Guard and the Army National Guard.

CDR Joseph Sundland has served in the U.S. Coast Guard since 1987. His tours have included PACAREA, the Coast Guard Academy, USCGC Mellon, *USCGC* Seneca, *and USCGC* Dependable. *He holds an M.S. in information technology management and is the deputy office chief and geospatial management officer of the U.S. Coast Guard Office of Enterprise Architecture and Governance.*

CAPABILITIES

The EGIS data and functionality includes:

NOAA raster nautical charts. These charts have been configured to automatically shift to the appropriately scaled chart for a specific geographic area.

Aerial imagery. This includes satellite imagery for the world and high-resolution aerial imagery for the United States and hundreds of cities around the world.

Homeland security infrastructure program data. This includes national-level data regarding emergency services, public health, chemical industry and hazmat facilities, educational institutions, telecommunications, water supply, energy facilities, government agencies, and transportation.

Advanced geospatial analysis. This includes the ability to plot MISLE activities within a specified distance or range of Coast Guard units, or any other point on a map. In addition, a reporting tool displays past, present, and planned MISLE activities.

Geocoding. This allows the user to zoom to a specific geographic location or street address, place, or geographic feature. Advanced features include the ability to convert a street address to latitude/longitude coordinates and to display directions and drive times between two points.

Identify features. Displays detailed information about all features displayed in the EGIS (including MISLE data) as well as logistics and readiness information for Coast Guard units.

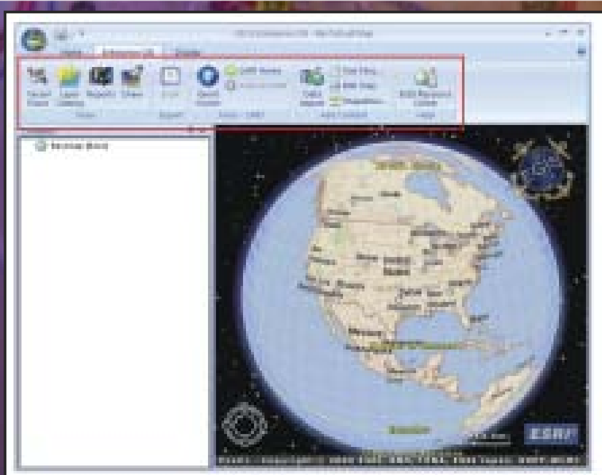
Draw tool. Allows the user to draw shapes and boundaries and set push-pin markers to search for data within these selections.

Plot databases and spreadsheets. The EGIS provides an easy-to-use wizard to display information from various locally held databases and spreadsheets.

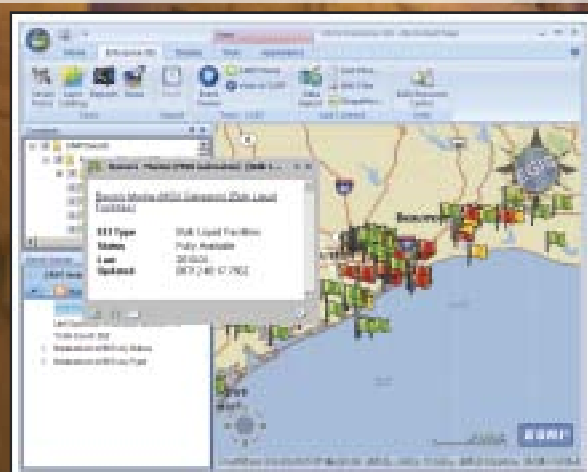
Vessel tracks. Displays near-real-time vessel positions, including predefined filters for type of vessel, status of vessel lookouts, vessels carrying dangerous cargos, and vessels with current operational controls. Historical vessel positions and track lines can be plotted, and user-defined geographic areas can be searched to identify all vessels that transited an area during a designated period.

Live briefing tool. Unlike a static presentation, all underlying EGIS data can be accessed and queried against during a presentation.

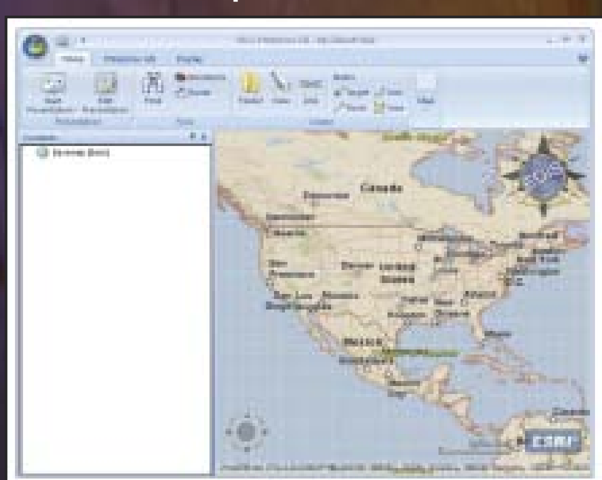
Data catalog. Allows the user to search against the EGIS data repository for information within a known geographic area or by specific data type.



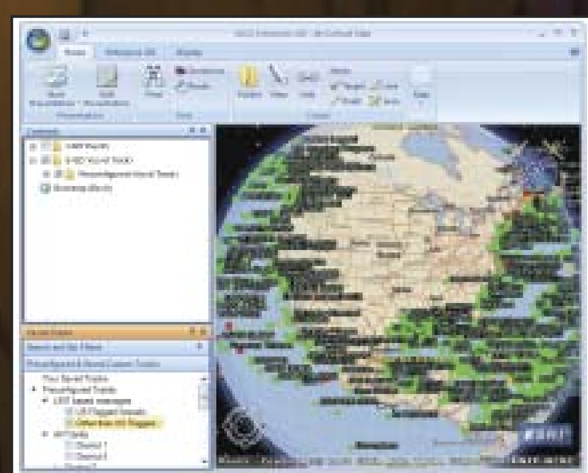
Coast Guard-developed tools.



Connectivity to the common assessment reporting tool.



Users can switch from 2-D to 3-D maps.



Displays LRIT data for U.S. and foreign-flagged vessels.

Transforming MDA Through Technology

Promising Capability

A look at the user-defined operational picture.

by CDR Kevin Keast
Chief, Communications and Sensors
U.S. Coast Guard Office of C4 and Sensors Capabilities

In the Not-So-Distant Future …

I sign into my workstation as the operations unit controller for the sector and a globe fills the screen. I use my "hand grabbing" tool to give the earth a spin as I decide whether to use the "fly to" search box or simply give the mouse wheel a few flicks to dial into my sector.

I choose the "fly to" capability, as I want to check the area where the station is conducting a boarding at a marina in New Haven, Conn. I fly in.

I have both my Blue Force Tracking and Automatic Identification System (AIS) layers activated, so I see the response boat off the pier. I can also see the yacht that is being boarded, as it is equipped with AIS.

My attention is redirected as I am alerted by the communications unit controller. A "mayday" was just picked up by the Rescue 21 system. "Send me what you have," I call out.

This time I use the mouse wheel to zoom out to see my sector area of responsibility, with the smaller station subdivisions. This is my default view. It includes the weather layer from the National Oceanic and Atmospheric Administration, and the marine event layer, which depicts the security zones for a sailboat regatta this coming weekend.

In seconds I see three lines of bearing on my screen; each depicts the location of a Rescue 21 remote fixed facility, also known as a "high site." I mouse over them and look at the caller details. I see that I have a reported person in the water and the dynamic water temperature gradients layer is showing dangerously cold water temperatures.

I click over to Station New London and am immediately online with the station, using my integrated intercom to Rescue 21. I trip the station's SAR alarm remotely and follow up with an announcement that blares over the station's loud hailer, "Person in the water in vicinity of Bartlett Reef, launch 45622. This is not a drill." After two more clicks, my search and rescue operations plug-in is active, and I am plotting a search pattern.

In the meantime, the situation unit controller focuses on the underway boarding and conducts a few queries of the Marine Information for Safety and Law Enforcement (MISLE) database to assist the on-scene boarding officer.

The User-Defined Operational Picture

This example describes what a user-defined operational picture or UDOP might bring to the world of command and control and IT systems, but what exactly is it?

The user-defined operational picture may be described as a single geospatial environment that allows users to customize and manipulate information using specialized tools and services to complete processes or tasks. The current focus is the UDOP's potential use to enhance command and control and situational awareness, but that isn't the limit of its use.

In the introduction scenario, we leverage the horsepower of the Coast Guard's Search and Rescue Optimal Planning System, a search and rescue planning and drift modeling tool. In the UDOP environment, tools like this would not be launched as a single application, but as an integrated part of a customizable, user-defined operational picture.

Service-Oriented Architecture

Service-oriented architecture (SOA) produces high-speed, high-availability, and high-quality data services that can be consumed by many users. Services are developed to provide a variety of functions, limited only by the state of the market technology and operational requirements.

In an SOA environment, newly developed applications—primarily applications that are geospatially oriented—do not typically provide the end viewer application to the user. Instead, they deliver a set of services or capabilities that can be displayed and manipulated using existing front-end applications.

UDOP and Legacy Applications

How does service-oriented architecture and a user-defined operational picture impact existing mission-essential applications? There is no universal answer. Each application must be re-evaluated to ensure it is in support of an operational or business process and focuses on valid operational requirements. As we move forward to recapitalize our information technology infrastructure, we must also ensure new systems transition toward an SOA framework.

It is particularly important that services are developed as part of an overall concept of operations, and that these services are in alignment with a larger overall enterprise architecture. This means that we need to capitalize on all existing functionality and capabilities and converge them into services that may be consumed by users.

The user-defined operational picture may not be the "front end" for all existing applications, but users have indicated that a common look and feel for the geospatial command and control applications is preferable. The UDOP as we understand it today may not be the overall solution, but the concept behind it may be applied to other IT-related functions, including support for case management, intelligence analysis, and logistics.

No matter the process need, it's likely that we'll find logical links back to our original geospatial user-defined operational picture and decide that creating a UDOP service or toolset may work better than developing a new front-end viewer or application. This concept of developing services will most likely save time and money by channeling resources directly to developing specified services and deploying a capability that can be used on existing display systems.

For example, applying a "service development" concept to develop a search and rescue surface picture must start with determining user needs. A surface picture (SURPIC) is a request from the Automated Mutual Assistance Vessel Rescue System (AMVER) that provides a snapshot of vessels in the AMVER database in a defined geographic region. AMVER vessels voluntarily submit their vessel positions and sail plans for search and rescue use.

In applying service-oriented architecture, enterprise architecture, and concept of operations fundamentals to the search and rescue SURPIC, it makes sense to tackle this operational requirement in the form of a service that reaches out to all available sources of vessel tracking information, including the Automatic Identification, Long-Range Identification and Tracking, and Vessel Management Systems. We also may want to add Common Operational Picture track data to provide a consolidated layered set of data to the user-defined operational picture.

The Way Ahead

To secure the success of the Coast Guard's command and control and information technology infrastructure, we must keep up to date with the latest in IT system technology and with the open enterprise architecture capabilities. To recapitalize our systems, it is vital that we document and understand our operational and business processes and transform these into actionable requirements.

In the past, the Coast Guard (not unlike many other agencies) built applications and tools that the users then adapted to. Our next challenge is to understand user requirements and leverage them to develop new systems. There is still much to learn about this promising capability. The good news is that the Coast Guard is on the right track, and moving forward.

About the author:

CDR Kevin Keast is a graduate of the U.S. Coast Guard Academy. He holds a B.S. and an M.S. in electrical engineering from the University of Rhode Island. His tours include service as commanding officer of an 82-foot patrol boat, chief of response at Sector Long Island Sound, and four years at the USCG Research and Development Center. CDR Keast currently serves as the division chief for communications and sensors for the Office of C4 and Sensors Capabilities.

Understanding Coal

by Mr. Richard Bornhorst, *Chemical Engineer, U.S. Coast Guard Hazardous Materials Standards Division*

Editor's Note: *Though coal is not a chemical, it does have unique physical and chemical properties. We are providing this information for the safety of those transporting and handling it.*

What is it?

Coal is a brownish-black rock formed by compression of decomposing plant material. Since it is primarily composed of carbon it is a useful energy source. In 2007, the total world coal production was more than 5.5 billion tons. Coal meets about 26 percent of the world's energy needs and generates about 41 percent of the world's electricity.[1]

How is it shipped?

Coal is generally shipped in bulk quantities either by rail, cargo vessel, or barge. For cargo vessel or barge transport, coal is loaded directly into the cargo hold without mark, count, or any intermediate form of containment such as packaging.

Coal is also sometimes shipped by self-unloading cargo vessels that have an integral conveyor belt system that moves coal from the cargo holds to an unloading arm. A self-unloading cargo vessel is advantageous when it becomes necessary to deliver coal to ports or waterfront facilities that lack the proper shoreside equipment.

The International Maritime Solid Bulk Cargoes (IMSBC) code specifies how coal is loaded, unloaded, and transported by cargo vessel for international shipments. Recent changes to the International Convention for Safety of Life at Sea will make the IMSBC code mandatory for all cargo vessels regardless of age, size, or character on January 1, 2011.

Why should I care?

➤ ***Shipping concerns.***

As the demand for energy increases every year, coal will become increasingly important and will be shipped in greater quantities. Under the provisions of the IMSBC code, coal is regulated as a hazardous material when transported in bulk by cargo vessel. The code contains provisions for shipping papers, trimming the cargo, segregation, temperature monitoring, and gas detection. All of these provisions will generally apply to coal because of its unique physical and chemical properties.

➤ ***Health concerns.***

Personnel exposure to coal dust generated from processing, transporting, or handling coal can cause pneumociosis (black lung), bronchitis, and emphysema. The permissible exposure limit for coal dust is a time-weighted average of 2.4 milligrams per cubic meter over the course of a working period, according to the Occupational Safety and Health Administration. Coal may also deplete the available oxygen in cargo holds and compartments. Some self-heating coals may give off carbon monoxide, which can be toxic at an air concentration as low as 50 parts per million.

➤ ***Environmental concerns.***

Although coal itself is generally not considered toxic or hazardous to the environment, it should be handled carefully and efficiently to minimize releases into the environment. Coal can be released into the environment during loading and unloading operations or during routine cleaning (cargo sweeping) operations. Releases from these operations may be prohibited, restricted, or allowed depending upon whether or not they occur in environmentally sensitive areas, coastal or inland waters, or the open sea.

➤ ***Fire and explosion concerns.***

Some coals may self-heat spontaneously and emit flammable gases, such as methane. A concentration between five percent and 15 percent methane in air can be flammable or explosive when exposed to a source of ignition. When methane is released from coal stowed on a cargo vessel, it can build up in the cargo hold, thus creating the potential for fire or an explosion. Some self-heating coals may also spontaneously combust during transportation. However, spontaneous combustion is not common. If it does occur, it usually only affects some of the stowed cargo.

What is the Coast Guard doing about it?

Industry has been transporting coal in bulk for many years with relatively few incidents. The safety provisions contained in the IMSBC code have been largely adopted by the coal industry on a voluntary basis. Nonetheless, industry practices will need to be brought into line with the international standards in order to further improve safety and facilitate the shipping of coal in international commerce.

About the author:

Mr. Richard Bornhorst is a chemical engineer in the Hazardous Materials Standards Division developing commercial regulations for transportation of hazardous materials and bulk cargoes and representing the U.S. at the International Maritime Organization's subcommittee on dangerous goods, solid cargoes, and containers, and the United Nations' subcommittee of experts on the transport of dangerous goods. He serves on the Transportation Research Board's committee on the transportation of hazardous materials and the Hazardous Materials Cooperative Research Program.

Endnote:

1. See the World Coal Institute website, http://www.worldcoal.org/resources/coal-statistics/.

SPECIAL SECTION

HAITI
HELP&HOPE

Earthquake Response

DHS Integrated Response Team Commander's Point of View

By RDML Roy Nash
Deputy Director, U.S. Coast Guard
National Maritime Intelligence Center

Help and Hope for Haiti

It's an experience I will never forget: Working with personnel from the Federal Emergency Management Agency (FEMA), U.S. Coast Guard Deployable Operations Group, Joint Task Force-Haiti, U.S. Agency for International Development, and numerous other agencies in supporting the people of Haiti. Seeing compassionate people work through difficult situations and find creative ways to care for others with only the tools and supplies at hand was a high-water mark for my career.

Close to midnight on January 15, 2010, just three days after a magnitude 7.0 earthquake struck Haiti, the Department of Homeland Security Integrated Response Team landed at the Port-au-Prince Airport. Our team, comprised of 18 Coast Guard and 25 FEMA members, was welcomed by our Air Force teammates already on site, who helped us locate a spot for our gear and supplies on the runway field, where we spent the first night.

The Scene

On day two, we moved to the American Embassy, a two-year-old building that, thankfully, was fully intact. We participated in an over-flight of Port-au-Prince and observed that a very high percentage of the dwellings in the city and surrounding area had collapsed or were significantly damaged.

The primary building material appeared to be concrete, so the collapsed and partially collapsed buildings were untenable. Numerous aftershocks made such places even more dangerous. Survivors were in the streets, as there was no place else to go.

The First Response

Large numbers of these survivors were injured and required urgent medical care. Urban search and rescue teams sought to find and save those who were trapped in collapsed buildings. Many responders were involved in restoring the flow of critical supplies.

Simultaneously, the U.S. Embassy staff worked to repatriate American citizens to the United States where they could be cared for. Other responders labored to reopen the seaport to allow the flow of humanitarian aid. The mission was clear enough, but responders struggled amid this devastation to ensure that Haitian survivors in desperate need of food and water received it in time.

Existing Relationships Aid Response

The DHS Integrated Response Team supported the U.S. Agency for International Development, the U.S. Embassy staff, and Joint Task Force (JTF)-Haiti on several fronts. Our small nine-man security detail supported the U.S. Embassy directly, providing security at American citizen repatriation points at the U.S. Embassy and the airport.

Among our team were two Creole translators, as well as a former Coast Guard Liaison Officer to Haiti who had worked with many of the people we needed to help re-open the port. Equally important to effective

U.S. assistance was the well-developed relationship that existed between the U.S. Coast Guard and the Haitian Coast Guard.

The U.S. Coast Guard maintains a liaison to Haiti, and our cutters have a history of active engagement with the Haitian Coast Guard. These relationships were vital to the Haitian Coast Guard being "up and running" shortly after the earthquake, certainly a symbol for its people that the Haitian government was operating.

The U.S. Coast Guard Liaison Officer to Haiti was at Haitian Coast Guard Station Killick at the time of the earthquake and immediately began assisting others. Three Coast Guard cutter crews were in Port-au-Prince Harbor almost instantly, and a testament to their on-scene initiative is captured in the articles that follow. Tremendous medical relief support arrived shortly thereafter from the U.S. Navy, Army, and Marine Corps, as well as from many non-governmental organizations. A 120-man Port Security Unit (PSU 307) then arrived to provide port security in Port-au-Prince, allowing the Army's 82 Airborne elements to shift to humanitarian assistance/disaster relief.

Restoring Communications Facilitates Accurate Assessment

Restoration of communications infrastructure was a critical need. Most critical was the capability to connect urban search and rescue teams with medical teams, medical flights, and logistics support. Coast Guard cutters, Navy ships, and their respective aircraft provided part of the communications solution.

Federal Communications Commission representatives, FEMA, and U.S. Coast Guard communications experts worked closely with local experts to restore cell phone coverage. With FEMA's communications van and expert staff located at the U.S. Embassy in Haiti, daily communications with the Secretary of the Department of Homeland Security and component agency principals was immediately facilitated, allowing the DHS Integrated Response Team to relay the current situation, logistics, and policy needs directly.

Placing the JTF-Haiti headquarters adjacent to the U.S. Embassy facilitated integration and unity of effort. Conference calls enabled agency principals and area and task force leadership to hear reports, ask questions, and gain a better understanding of what was actually happening in Haiti. This on-the-ground information allowed those back in the U.S. to better allocate resources and assist with problem-solving.

Concurrent Efforts

During these ongoing efforts, a U.S. Coast Guard Marine Transportation System Recovery Unit (MTSRU) surveyed the port to determine the status of waterways, piers, and facilities, and developed courses of action with local port authority personnel to best open the port to the flow of humanitarian assistance.

Under the Joint Task Force-Haiti leadership, Army and Navy dive teams evaluated the damaged pier structure and re-evaluated after each significant aftershock. The Coast Guard MTSRU held twice-daily meetings with the local port authority and Joint Task Force leaders from several components to advance port opening methods and remove barriers, ultimately allowing humanitarian assistance to move through port facilities and to distribution points throughout Port-au-Prince.

Concurrently, U.S. Immigration and Customs Enforcement, Customs and Border Patrol, and Transportation Security Administration personnel shored up critical security processes at the Port-au-Prince airport for repatriating personnel and helped meet the needs of the critically injured.

In the Following Pages

There are so many stories and pictures that depict the field situation and response efforts. The logistics support from across the Coast Guard, the Departments of Homeland Security, Defense, State, Health and Human Services, and the entire U.S. government was equally extraordinary. In the following section we will highlight some of our efforts.

During the response, daily reporting "up the chain" ensured requests for support and policy determinations were given immediate attention. It is not possible to capture and describe all manners of support provided, but suffice it to say that everything we could think to ask for was supplied.

Looking back, if you are ever in a position to say "yes" and be involved in a humanitarian mission, do it! This is truly fulfilling work. Thanks to all of you who supported or deployed to Haiti in response to the earthquake this year.

Ingenuity and Determination in Action

U.S. Coast Guard cutters crew the early response.

by CDR Jim Spotts
Commanding Officer
U.S. Coast Guard Cutter Tahoma

Members of the Haitian and U.S. Coast Guards keep the crowd organized at the Killick Haitian Coast Guard Base clinic. U.S. Coast Guard photo by Seaman Melissa Cardwell.

When the earthquake struck, U.S. Coast Guard Cutter *Tahoma* was moored for repairs at Naval Station Guantanamo Bay, Cuba. That night the crew prepared to respond, loading medical and relief supplies, gathering information from the media, and contacting people in Port-au-Prince. On January 13, 2010, the day after the quake, *Tahoma* was directed to sail for Port-au-Prince and rendezvous with its sister cutters *Forward* and *Mohawk*.

The Makeshift Trauma Clinic

On the morning of January 14, the commanding officers from *Tahoma* and *Mohawk* went ashore at the Killick Haitian Coast Guard base outside Port-au-Prince to assess the situation. They found the majority of Haitian Coast Guard members at their watch stations, ready to take on assignments, even though many had lost their homes and some had lost family members.

HS1 Berman (in glasses) and HS2 Gomez help treat a Haitian man who has a crushed arm and a large laceration on his head. U.S. Coast Guard photo by Seaman Melissa Cardwell.

Operations specialists put together a flight plan for response pilots. USCG graphic.

A Sri Lankan Army contingent from the United Nations Stabilization Mission to Haiti, Haitian Coast Guard medical personnel, and doctors and nurses from a local hospital that had collapsed treated dozens of critically injured people at a temporary trauma clinic onsite. Supplies were exhausted. In one corner, doctors were using dental floss to stitch lacerations; in another corner, workers used tree branches as makeshift splints.

Both commanding officers agreed that the cutters could do more than just deliver relief supplies.

Back at the vessels, the executive officers mustered personnel with any kind of medical training, organized security teams, and loaded what medical supplies they could into the small boats. By 1:00 p.m. personnel from both cutters were working alongside the other first responders, treating the injured.

Over the next several days, crewmembers from *Tahoma* and *Mohawk* sutured severe lacerations, splinted compound fractures, and, sadly, prepared limbs for amputation. The situation was overwhelming and crewmembers found the number of injured children disturbing.

As CPO Truman Watkins described the dire situation, "I saw 15 to 20 kids in one day, not one of them over the age of 10. We did stitches, reset broken limbs … We washed out wounds and bandaged them, but the bandages will be useless by tomorrow. Some people had arms or legs crushed so badly they needed to be amputated."

continued on page 55

Miracles Mix With Tragedies

Crewmembers experienced an incredible range of emotions as, throughout the event, there were moments of dire tragedy mixed with those of surprising hope.

- In one instance, a U.S. Navy petty officer somehow got hold of a crewmember's e-mail address and wrote to ask if *Tahoma* could help his brother who was injured in Port-au-Prince. The information was received late in the day and his location was not exactly known. *Tahoma* passed the information to the organizations working urban search and rescue.

  Following up the next day, *Tahoma*'s operations officer called the Navy Petty Officer in the states to get more information in the hopes of executing a rescue. Tragically, the petty officer's brother had passed away the night before.

- One morning, crews arrived at the Killick clinic to find a Coast Guard chaplain administering last rites to a seven-year-old boy who had been killed when his cinderblock home collapsed. His mother was distraught and tried to drown herself later that morning. Cutter crewmembers pulled her out of the water and stayed with her until she could receive help.

- On the second day of the relief effort, three young women brought a baby into the Killick clinic. They had just dug her out from under a house and she was covered in blood. Workers assessed that she wasn't more than three months old, and surprisingly wasn't crying. Was the blood-soaked infant so injured that she was incapable of response? A crewmember examined her major bones and checked for pain as she calmly looked back at him. He asked the young women how she was found. They told him that the mother and father had put the child between them when their house had collapsed. They had both been crushed, but the baby came away without a scratch.

From left, ENS Sweet, aircrew from Air Station Clearwater, and MK2 Meader assist with the birth of a healthy 5-lb. baby boy on *Tahoma's* flight deck. U.S. Coast Guard photo.

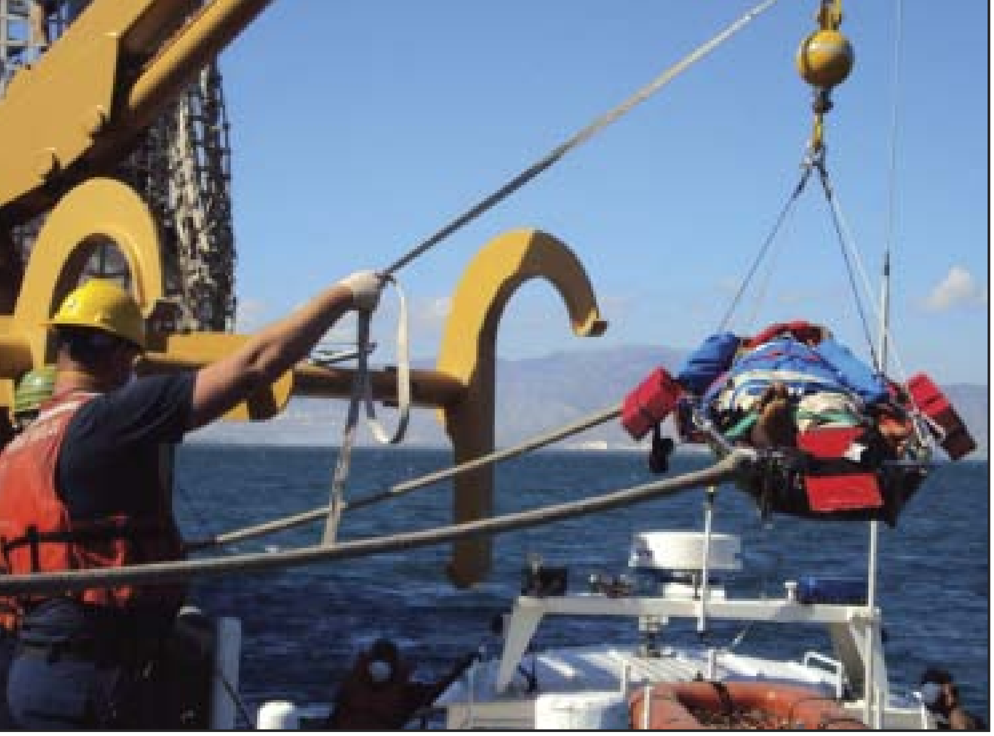
- On the third day of operations, corpsmen thought a woman had a stillborn baby lodged in her birth canal. After she was transported to *Tahoma*, she went into labor while waiting for medical evacuation. Much to the disbelief—and joy—of the corpsmen, she delivered a healthy five-pound baby boy.

Crewmembers from the Haitian Coast Guard and the Coast Guard Cutter *Tahoma* transport the injured to the *Tahoma*. From there, they were evacuated by helicopter to a medical facility. All photos by USCG Seaman Melissa Cardwell.

Crewmembers from the Coast Guard Cutter *Tahoma* prepare a critically injured survivor for medical evacuation.

ENS Laura Gibbings comforts a Haitian child waiting for medical transport from *Tahoma's* hangar.

Once additional medical and security personnel arrived at the Killick Coast Guard Base, a landing zone was set up on the soccer field where Navy and CG helicopters would load the injured and transport them to advanced medical facilities.



SN Leary directs a patient lift using *Tahoma's* single-point davit. U.S. Coast Guard photo by Seaman Melissa Cardwell.

CG Helo 6039 from Air Station Clearwater lands on a soccer field to pick up the injured. U.S. Coast Guard photo.

Transporting the Injured

As they worked at the trauma clinic during those first crucial days, crewmembers voiced concerns that the people they were working so diligently to save would likely die if they were not taken to a hospital. This presented significant challenges. Cell phone reception—the primary means of communication—was out, so no one knew which hospitals were operational or had room to accommodate the injured. Additionally, the U.S. Navy's medical ships had not yet arrived.

Tahoma reached out to the non-governmental organizations operating in Haiti to see what resources were available. Fortunately, Sacred Heart Hospital in Milot had the capacity to care for 200 additional patients and was ready to receive the injured.

Nurses at Sacred Heart Hospital in Milot offload the injured. U.S. Coast Guard photo.

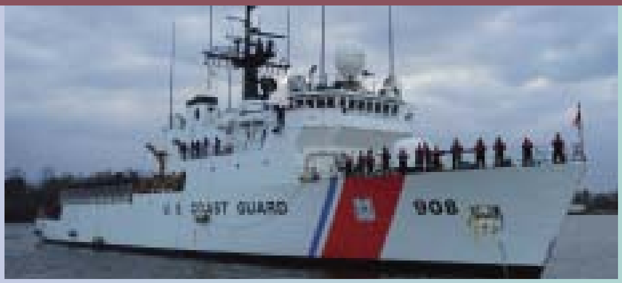
This was good news, but locating the hospital was just the first of many challenges. There was no good information regarding the security situation in Port-au-Prince. Workers knew that in 2009 the Haitian National Police had trouble controlling a crowd that swarmed to the Killick facility when USNS *Comfort* arrived for a humanitarian medical mission. At that time, the police force was at full strength and Haitian infrastructure intact.

Today's workers worried that landing a helicopter at the Killick base could cause the clinic to be overrun.

Necessity Breeds Ingenuity

Workers quickly determined that the safest course of action would be to transport people out to the cutters via small boats, then fly them to Sacred Heart Hospital. The operations specialists worked with staff from Sacred Heart and their parent organization in Ludlow, Mass., to put together a flight plan pilots could use to identify a landing zone near the hospital.

Jacks of All Trades



Throughout this operation *Tahoma*'s crew was called upon to execute missions for which they had little training or experience. Typical Guardians, *Tahoma*'s crew of 100 was a resilient group, mostly made up of New Englanders who take on challenges with an unusual stoicism. During this response, very junior people came up with safe, practical, and effective ways to accomplish tasks.

For example, while some of their crewmates were working at the Killick clinic, others surveyed port facilities and disseminated survey information using a digital camera, a hand-held GPS, and Google Earth. Dozens of agencies used these makeshift surveys to identify which piers could receive goods during the first days after the earthquake.

In another instance early in the response, *Tahoma* received the following e-mail: *"… Please let us know if you can make this miracle happen. We are standing by at Hopital Sacre Coeur waiting for this woman to be delivered. God speed!"*

Found further down the e-mail chain:

"CNN just contacted us. Anderson Cooper was present when woman rescued from deep rubble this afternoon! CNN wants to get her to HSC—extensive wounds. Can you convey information to next pilot in or however anyone can do it? CNN needs to know staging area, etc. She needs immediate airlift out. Pls advise. Thanks!"

The first instinct of any Guardian is to respond immediately, save a life, and worry about the details later. But leaders must ask the tough questions: How dangerous is this? Is there a way to get this done with less risk? Are we doing this for the right reasons, or are we trying to get good coverage on CNN?

After consideration, the decision was made to get the woman right after the cutter's embarked helicopter was done transporting other critically injured people. *Tahoma*'s operations center coordinated information from an individual on the ground via e-mail through a non-governmental organization in the states.

To vector the helicopter to the right location, *Tahoma*'s operations specialists e-mailed a request that vehicles on the ground flash their lights. This confirmed the helicopter was in the right place and could land safely. As a result, the woman was successfully transported to a medical facility.

Although all agreed this would be the safest transport method, there were significant concerns about moving patients with spine and neck injuries from the small boats to the cutters. This challenge was overcome when a seaman apprentice aboard *Tahoma* figured out a way to lift patients from small boats onto the flight deck with the single-point davit.

During the first day of flight ops, *Tahoma* crewmembers transported the most severely injured people to Sacred Heart Hospital aboard the embarked Dolphin helicopter. The next day Jayhawks from Operations Bahamas, Turks, and Caicos joined the effort, along with a second Dolphin from one of the cutters working off the north coast.

A few days later, Seahawks from USS *Carl Vinson* started transporting patients when leaders determined they could safely open a landing zone at Killick. By January 20, 2010, more than 40 people a day were being transported to Sacred Heart, USNS *Comfort*, USS *Bataan*, or USS *Carl Vinson*.

In all, the crewmembers working at the clinic estimate that between 500 and 1,000 injured people received medical assistance. The exact number cannot be known for certain because they were too busy to keep track.[1] The only statistics the crews can agree upon is that there were three deaths and two births between January 14 and January 21.

About the author:

CDR Jim Spotts is the Commanding Officer of U.S. Coast Guard Cutter Tahoma*, a medium-endurance cutter homeported in Kittery, Maine, at the Portsmouth Naval Shipyard. Its normal missions include counter-drug patrols in the Caribbean, alien migration interdiction operations in the Florida Straits, and fisheries patrols in New England waters.*

Endnote:

1. A detailed account of the day-to-day activities at the clinic is available at http://coastguard.dodlive.mil/index.php/2010/01/guardians-report-in-hs1-larry-berman/.

Deployable Operations Group

The name says it all.

by CDR Rich Condit
Deployable Element Team Leader
U.S. Coast Guard Deployable Operations Group

Within hours of the initial reports of a massive earthquake striking the island nation of Haiti and destroying the capital city of Port-au-Prince, the USCG Deployable Operations Group (DOG) developed a logistics plan to move self-sustaining personnel and equipment to the devastated region.

Members of Maritime Safety and Security Team San Francisco stand security at the Toussaint Louverture International Airport. The nine-person Maritime Law Enforcement/Force Protection Team provided security at the airport, guarded convoys, and provided medical supplies and support to the earthquake victims. All U.S. Coast Guard photos by CDR Rich Condit.

The DOG was created in 2007 for this very reason—to supply operational commanders throughout the U.S. with specialized capabilities to meet mission requirements. In the last three years, DOG adaptive force packages have deployed throughout the continental United States and as far away as Cuba, the Gulf of Aden, Kuwait, and Iraq on missions ranging from force protection and anti-terrorism to oil spill response and anti-piracy.

The Package

The DOG rapidly identified and assigned an adaptive force package for the Department of Homeland Security (DHS) that could interface with agencies on the ground in Haiti and help identify which additional DHS assets were needed in theatre. The initial DOG adaptive force package consisted of:

- Incident Command System experts with specialties in operations, planning, communication, and logistics/engineering;
- a member with previous port safety experience in Port-au-Prince;
- a Creole speaker;
- a combat-trained corpsman;
- a nine-person armed security team.

As the DOG was readying these personnel, DHS assembled team members from the Federal Emergency Management Agency (FEMA). These forces would form a DHS Integrated Response Team (DHIRT) that would deploy to the island and assist Department of State and Department of Defense efforts.

Within 12 hours of the official request from DHS, the team, led by Coast Guard Rear Admiral Roy Nash and Damon Penn, Assistant Administrator of FEMA's National Continuity Programs Directorate, rendezvoused at Coast Guard Air Station Clearwater, Fla. For the FEMA personnel, this would be their first overseas deployment.

Damage to the port hampered delivery of relief supplies. U.S. Coast Guard and other responders worked to survey and repair the port infrastructure. U.S. Coast Guard photo.

Hit the Ground Running

Within hours of arriving in Clearwater, the newly formed DHIRT flew directly to Port-au-Prince aboard two Coast Guard C-130 Hercules aircraft. Once there, they established operations at the American Embassy, developed an Incident Command System structure on the ground, and provided a direct link to DHS leadership in Washington.

DHIRT members also coordinated operations with the Department of Defense's Joint Task Force Haiti, the Joint Interagency Humanitarian Coordinating Center, the U.S. Embassy, and the United States Agency for International Development. As challenges ultimately arose in other agencies, the DHIRT would support the other agencies as needed.

In the course of these duties, DHIRT members identified roles that other DHS agencies would best be suited to perform. This effort led to the integration of Immigration and Customs Enforcement and Customs and Border Protection personnel.

In addition to their role synergizing U.S. government response efforts, DHIRT personnel also assisted in the reconstitution of Haiti's cell phone network and 911 dispatch center; delivered food, fuel, water, and medicine to orphanages and villages in dire need; provided security and humanitarian relief to American citizens being evacuated at the airport; and assisted in reconstituting the port at Port-au-Prince.

In the weeks following the earthquake, the DOG would deploy three additional adaptive force packages, including a security team of 33 law enforcement specialists, a 118-member port security unit, and four hazardous materials experts assigned to the port infrastructure reconstitution team.

About the author:
CDR Rich Condit is chief of the Personnel Services Division at the Deployable Operations Group in Arlington, Va. His previous tours include Commander, Group Hampton Roads, Response Boat-Small project officer at USCG headquarters; and Commanding Officer, Station Atlantic City, N.J. He deployed as part of the DHIRT, and served as the Deputy Operations Section Chief.

Mr. Damon Penn of the Federal Emergency Management Agency and U.S. Coast Guard RDML Roy Nash lead the nightly Department of Homeland Security Integrated Response Team planning meeting.

Evacuation of U.S. Citizens

by LCDR Robert Hengst
U.S. Coast Guard Deployable Operations Group
DHS Integrated Response Team Member

The DHS Integrated Response Team (DHIRT) arrived at the Toussaint Louverture International Airport in Port-au-Prince, Haiti, on the first weekend after the earthquake. It looked like a scene from an old war movie. Tan and olive-green tents laid claim to formerly vacant land. Soldiers took refuge from the sun under the wings of a long-abandoned airliner as cargo planes landed on a runway in the distance, with more queued on the horizon. The "control tower" was set up on a folding table in the middle of the field between the runway and tarmac.

Amid this disorder, scores of U.S. citizens were gathering en masse for flights out. Recognizing the growing logistical and humanitarian challenge of processing outbound U.S. citizens in great numbers at the airport, the U.S. Embassy's consulate staff asked the Department of Homeland Security's Integrated Response Team for help.

24-hour Ops

The embassy was faced with an onslaught of U.S. citizens desperate to leave the country since the earthquake had rattled the capital city and neighboring regions. Consulate employees were working continuously to maintain 24-hour operations: eight hours at the embassy, eight hours at the airport, and then back to the embassy to resolve issues and prepare for the next shift. Of the estimated 45,000 U.S. citizens on the ground in Haiti, hundreds—if not thousands—were gathering outside the embassy and at the airport.

The DHIRT response in support of the consulate was two-pronged. Our three-person team assisted with logistics, translation, and medical support for the consulate operations at the airport. Meanwhile, the Maritime Safety and Security Team (MSST) San Francisco Force Protection team was assigned to assist the Department of State Diplomatic Security Service (DSS). This combined security team stood watch over the line waiting to enter the embassy and the line waiting to enter the airport.

Organized Chaos

Once U.S. citizens cleared the first level of vetting by the DSS/MSST security teams, they entered the airport compound. Earthquake damage had rendered the airport structure unsafe, forcing the civilians waiting for a space-available airlift to stand on the tarmac inside the airport compound, often not more than 30 yards away

American citizens evacuate Haiti aboard a HC-130 aircraft from Air Station Sacramento. USCG photo by LCDR Drew Gorman.

LCDR Robert Hengst of the USCG Deployable Operations Group checks the identification of American citizens before they board evacuation flights. U.S. Coast Guard photo by Chief Petty Officer Paul Cormier.

Coast Guard Petty Officer 1st Class Leroy Marcel (left), an electronics technician for Marine Safety and Security Team in Miami acts as a translator, assisting Haitian Americans evacuating post-earthquake Haiti. U.S. Coast Guard photo by Petty Officer 3rd Class Stephen Lehmann.

Petty Officer 1st Class Jonathan Edwards, a health services technician assigned to USCG Maritime Safety and Security Team New Orleans, provides medical care to a Haitian child at the Toussaint Louverture International Airport. U.S. Coast Guard photo by Petty Officer 1st Class Marcel Leroy.

Coast Guard Petty Officer Gustavo Albaladejo, a flight engineer for Coast Guard Air Station Clearwater, Fla., assists Haitian Americans prior to an air evacuation to Homestead, Fla. U.S. Coast Guard photo by Petty Officer 3rd Class Brandon Blackwell.

from large military cargo planes. Consular employees re-checked individuals for proper documentation, then created flight manifests in groups of 50 to 200. Once manifested, security teams maintained careful watch to ensure different groups or individuals didn't mix together.

When a cargo plane landed and was unloaded, the aircraft commander would notify the consular employees how many people it could transport back to the U.S. The evacuees had no say in where they would go, when they would get there, or what their follow-on plans would be, but at that point, anywhere was better than Haiti.

Security for Loading Ops

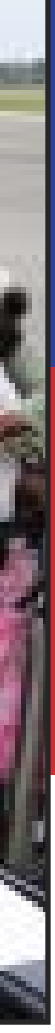
Once a plane was ready, we escorted the manifested passengers across the airfield to the outgoing aircraft—mostly military cargo planes. These aircraft are not equipped like commercial airliners, as they were designed to carry cargo, not people. Imagine a warehouse with wings.

The elderly and handicapped sat in the few jump-seats that fold down from the fuselage. Everyone else—up to 200 people—sat on the deck of the plane with cargo straps across their laps, like cargo.

Providing security for the walk to the plane proved to be a difficult job, as people would sneak into the lines and up into the gaping cargo doors of the aircraft. For the safety of the passengers and to protect the security of the U.S., we checked passengers against the manifest and escorted out those who didn't match up.

Specialized Assistance

In addition to security duties, the DHIRT worked to relieve the consular employees and provide comfort to U.S. citizens in their time of need. Petty Officer 1st Class



CDR Rich Condit holds a young earthquake victim aboard an evacuation flight. U.S. Coast Guard photo by Chief Petty Officer Paul Cormier.

U.S. citizens living in Haiti wait to be evacuated from the Toussaint Louverture International Airport in Port-au-Prince. U.S. Air Force photo by Master Sgt. Russell E. Cooley IV.

U.S. Coast Guard HS2 Jonathan Edwards, from Coast Guard Maritime Safety and Security Team New Orleans, and ET1 Leroy Marcel, from MSST Miami, assist an American citizen in Port-au-Prince, Haiti, awaiting transport to the United States. U.S. Coast Guard photo by Petty Officer 3rd Class Brandon Blackwell.

Marcel Leroy of MSST Miami translated for those who couldn't speak English. His command of the Haitian Creole language kept order among the masses of people and allowed us to communicate effectively with the thousands of people who passed through our lines.

Petty Officer 2nd Class Scott Edwards of MSST New Orleans provided medical assistance, from maintenance of health issues that had already been addressed to individuals in need who hadn't seen a medical professional since the earthquake hit. His diligent work was recognized when the Department of Health and Human Services personnel in Florida reported they were seeing marked improvement in the health and well-being of the people they were receiving from the evacuation flights.

LTJG Mike Abernethy of MSST San Francisco and the members of his force protection team showed compassion to all the people who waited for days for the chance to evacuate to the United States. His team maintained order and calm, preventing potentially volatile situations from igniting.

In the end, U.S. Embassy personnel were able to process more than 12,000 people with DHIRT assistance and set Department of State records with more than 1,700 people evacuated in one 24-hour period.

About the author:
LCDR Rob Hengst is the Deputy Division Chief of Logistics and Engineering at the Deployable Operations Group in Arlington, Va. His previous tours include civil engineering, marine safety, and underway time. He was the Deputy Logistics Officer for the Haiti DHS Integrated Response Team.

Multifaceted Security, at the Ready

MSST San Francisco's MLE/FP team.

by LTJG Michael Abernethy
Force Protection Team Leader
MSST San Francisco MLE

Maritime Safety and Security Team San Francisco's Maritime Law Enforcement and Force Protection (MLE/FP) team, designed primarily for anti-terrorism and port security, was recalled from training in San Diego, Calif., to join the Coast Guard's response to the earthquake in Haiti. Our nine-person team, augmented by a combat corpsman and Creole translator, boarded a flight across the country and on to Port-au-Prince.

The team's orders: Provide security for a DHS team of FEMA and Coast Guard responders providing humanitarian assistance amid the challenging conditions in Haiti's capital.

We arrived at the Port-au-Prince Airport late on Jan. 15, 2010 and met with RDML Roy Nash, who commanded the Coast Guard's Deployable Operations Group team, as well as U.S. Federal Emergency Management Agency (FEMA) personnel. Once in country, we were billeted in a makeshift camp in the middle of the airfield.

American Embassy Security Detail

The next morning, the teams moved to the American Embassy and provided security for FEMA convoys transporting communications equipment, food, water, and medical supplies throughout Port-au-Prince. At the embassy we supported the Diplomatic Security Service, since their personnel had been working around-the-clock for the last few days, as thousands of American citizens sought repatriation to the U.S. through the embassy.

With the stifling heat and extremely long wait for entry into the embassy, we triaged the people in line to best utilize the limited medical supplies and support. Those with the most extreme needs—elderly people with obvious medical conditions, small children, and those with severe injuries from the earthquake—received treatment and whatever food and water that was available.

The toughest job was preventing the rest of the hungry and thirsty people in line from rioting or trying to steal relief supplies from those in most desperate need. Suffering from extreme heat and hunger, small groups in the crowd grew restless and began pushing their way toward the front of the line, shoving weaker people out of the way. In order to calm the crowd, five MLE/FP team members adjusted their security approach and

dealt with the most aggressive people while a small group of medical workers developed a plan to distribute food.

Securing Convoys

When not providing security at the embassy, team members coordinated FEMA supply convoys, distributing much-needed food, water, and medical supplies to orphanages and small villages, many of which had been overlooked by the larger relief effort.

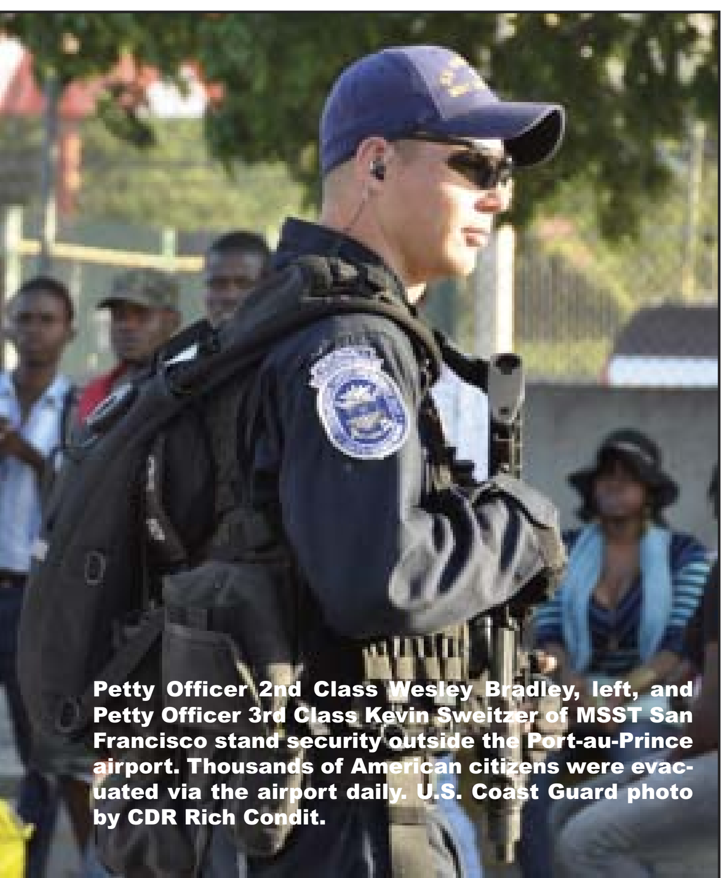
In addition to humanitarian relief convoys, we escorted convoys of critical communications equipment and helped re-establish communications for relief workers and the nation's 911 phone system.

Airport Security, Medical Triage

As crowds outside the airport gates began to grow, the need for increased security emerged. Non-U.S. citizens were attempting to get on U.S. military planes evacuating citizens back to the United States.

Team members were approached by hundreds of Haitians each day trying to get themselves or their loved ones into the airport for evacuation. Teenagers would jump the perimeter fence and dash across the airfield and runway to try to sneak onto planes. Parents would plead to have team members take their small children to the United States.

It's difficult for a Guardian to say "no" to a person in need. But for the refugees' safety and for U.S. security, we had to prevent these efforts. Fortunately, team members were able to help the many in need of medical attention.



Petty Officer 2nd Class Wesley Bradley, left, and Petty Officer 3rd Class Kevin Sweitzer of MSST San Francisco stand security outside the Port-au-Prince airport. Thousands of American citizens were evacuated via the airport daily. U.S. Coast Guard photo by CDR Rich Condit.

On what was to be the final day of our airport security mission, a station wagon approached four MLE/FP team members who were standing guard on the airport perimeter. In the back of the car was a woman who had been paralyzed when a wall fell on her. Team members transported her to a tent operated by the University of Miami Hospital.

Then a woman approached them and pointed at a vehicle that held five critically injured children. Team members took the children to the U.S. Army Special Operations medical tent.

While returning from the tent, one of the team members spotted a small figure in a ditch. As he approached, he realized it was a young boy who appeared to be nearly starved to death. He carried the boy to the airport command center where he was given food and water, and he regained strength. When a translator asked the boy how he got there, he said that his family was dead and a white man had left him at the airport.

Port Security

In the remaining days of our mission, the MLE/FP team was reassigned as a quick reaction force for a U.S. Coast Guard port security unit that had protected the port complex in Port-au-Prince. Several days later we were released from the mission and returned home.

In the final analysis, our nine-person team from MSST San Francisco, the combat corpsman from MSST New Orleans, and the Creole speaker from MSST Miami aided in the evacuation of more than 12,000 American citizens; distributed food, water, and medical supplies to a small village, orphanages, and a hospital; and had secured much-needed medical attention for countless Haitians.

In addition to these missions, the team partnered with the U.S. Army, U.S. Marine Corps, Diplomatic Security Service, FEMA, and the U.S. Embassy Consulate General's staff to do whatever it took to improve the situation for the Haitian people. In short, we demonstrated that the Coast Guard is indeed always ready.

About the author:

LTJG Michael Abernethy is the MSST San Francisco MLE/FP team leader and was the force protection team leader during Operation Unified Response in Haiti.

Air Station Clearwater

At work behind the scenes.

by LT William Friday
Aircraft Commander, Asst. Supply Officer
U.S. Coast Guard Air Station Clearwater

The morning after the earthquake, Coast Guard Air Station Clearwater sprang into action to begin its response.

Air Support

The crew of a C-130 Hercules fixed-wing aircraft from the air station launched at 4:30 a.m. to assess the damage in Port-au-Prince and provide the first images of the devastation. "We wanted to land and provide assistance, but we didn't know if the airport runway was damaged … our main purpose was to survey the damage," explained LCDR Elizabeth Fielder, pilot of the C-130.

Coast Guard helicopter 6039, which was forward-deployed to Providenciales, Turks and Caicos, was the first American asset to respond as well as the first to land in Haiti to transport critically injured patients to Guantanamo Bay, Cuba, approximately 200 nautical miles west of Port-au-Prince.

All told, Air Station Clearwater recorded more than 400 flight hours in support of Haitian response and relief.

Back at the Air Station

Behind the scenes, personnel worked diligently to perform tasks that allowed Coast Guard assets to achieve mission success. As SK3 Edward Taboada, storekeeper at Air Station Clearwater said, "I know that I contributed to the overall success of the missions in Haiti. If I didn't have those parts, tools, or equipment stocked, the maintenance people would not be able to have the helicopters or C-130s up."

The supply department worked overtime ensuring pallets of water, medical supplies, and toiletries were off-loaded and pre-staged for the fixed-wing aircraft to transport. The day after the earthquake, SK3 Christina Whitehair noted, "I spent hours running around town buying tents, sleeping bags, water, and food for deployed crews."

The galley division prepared box lunches for aircrews and pre-deployed personnel. Duty cooks FS3 Eric Toler and FS3 Joshua Holmes commented, "We had to break out more provisions and change the evening meal because of the influx of people that were pre-staging on base." They kept the galley open long after normal working hours to accommodate the surge. "Right at the last minute, we got 35 people from FEMA who had to get on a flight to Haiti," said Toler. "Holmes and I provided them with one last hot meal."

The medical department was just as busy. "Everyone was working overtime. It required members to work in other areas of the clinic because the assigned person would be out participating in flight operations," stated CWO Timothy Nash, clinic administrator at Air Station Clearwater. Clinic personnel provided health care to more than 1,000 medical patients and 409 dental patients, filled 1,543 prescriptions, and provided pre-deployment screenings to personnel from FEMA, Immigration and Customs Enforcement, and USCG Port Security Units 307, 308, and 313.

Even further behind the scenes, the C-130 load cage processed more than 442,000 lbs. of cargo destined for Haiti and units in theatre. AMT2 Scott Woodill was the point man for " … everything that came through the load cage." Aircraft from USCG Air Stations Mobile, Sacramento, and Elizabeth City started arriving hours after the earthquake and delivered bottled water, diapers, baby

Petty Officer Rick Weber loads a pallet of supplies brought by Secretary of State Hillary Clinton. She then boarded the aircraft and the Coast Guard crew flew her and the supplies to Haiti. All U.S. Coast Guard photos by Petty Officer 3rd Class Pamela J. Manns.

Once in Haiti, Secretary of State Hillary Clinton disembarks a Coast Guard HC-130 Hercules aircraft from Air Station Clearwater, Fla.

Crewmembers from Air Station Clearwater unload food and supplies from a Coast Guard HC-130 Hercules aircraft at the airport in Haiti. The aircrew then helped American earthquake refugees board the aircraft and brought them to Homestead, Fla.

bottles, MREs, donated clothes, tents, generators, communication equipment, security gear, and more.

When asked about his impact Woodill said, "I am just proud to be part of the Coast Guard. We don't practice for this massive mobilization of troops or gear, we just do it!"

About the author:
LT Friday has served in the U.S. Coast Guard for 17 years, most notably as a helicopter pilot, and has received the CG Air Medal, Joint Service Commendation Medal, CG Commendation Medal, five CG Achievement Medals, and three Letters of Commendation.

Courage Through Tears

by CDR Daniel Deptula
Deputy Planning Officer
DHS Incident Response Team

I was a member of the DHS Incident Response Team that deployed to Haiti just days after the severe earthquake struck. As we walked through the fractured earth, surveying the damage at the south gate of the port, it was clear that the roadway, guard shack, signs, vehicle inspection station, fences, light poles—everything that once depicted a facility that conformed to international regulations for seaport security—was destroyed.

Jocelin Villier, the Port-au-Prince Port Facility Security Officer for Haiti's National Port Authority, turned to me and said, "Everything we did while you were here is now gone."

Past Ties

From 2006 to 2007, I was assigned to the U.S. Embassy in Port-au-Prince as the Coast Guard Liaison Officer to Ambassador Janet Sanderson. I got to know many Haitians—many in government, many in the Haitian Coast Guard, many at the embassy, and many at the port authority. Jocelin was one of my favorites.

"Everything we did while you were here is now gone."

He was young, bright, graduated from the U.S. Coast Guard Officer Candidate School a few years earlier, a Haitian Coast Guard Reservist, and in a position of great authority within Haiti's seaport authority. I saw a bright future for him, and when I visited the seaport in Port-au-Prince, he was often the person I spent most of my time with providing ideas and guidance on port security best practices. He implemented many of them.

When I first arrived in Haiti in 2006, the International Ship and Port Facility Security Code was being implemented worldwide. This code is required for efficient international seaport trade, allowing ships to go unimpeded without excessive controls placed on them that would cause delays and add cost to the process. Haiti could ill afford non-compliance, as most of their fragile economy—the poorest in the Western Hemisphere—is run through seaports with more than 90 percent of these transactions coming to and from the United States. The deadline for compliance was approaching in 2007, when enforcement of these regulations would come into effect.

Unfortunately, Haiti's newly elected government was just getting organized, and the infrastructure upgrades in the chosen seaports and necessary training to achieve compliance were extensive and costly. The odds were stacked against them. The world prepared to impose significant restrictions on cargo ships coming from Haiti.

However, at the end of 2007, after diplomacy, mentorship, tricky security operations to remove criminal activities in the port areas, international aid, political will, field-level coordination, and back-breaking labor, ISPS compliance was achieved in Haiti's three main seaports. I left my tour as the Coast Guard Liaison Officer just before the final inspections were conducted and missed out on seeing the final verdict. However, the celebrations of this triumph were often discussed in correspondence afterwards, and there was considerable confidence and pride among those involved.

The Sorrowful Present

Now, to return to Haiti and witness the level of destruction, despair, and impact to the friends and colleagues I once worked with side-by-side was—like the earthquake itself—crushing.

I felt elation at every chance meeting, followed quickly by grief for the injured or lost.

Jocelin's face showed a complex set of emotions while he spoke to me. The enormity of the situation in front of us was just a fraction of his worries. His home was destroyed and he was sleeping in his car. I could tell by looking into his haunted eyes that he was, at times, reliving the horrors of the earthquake and its aftermath.

But even at times like this, joy can intermingle with sorrow. He told me he was planning to get engaged to the woman I introduced him to almost three years ago. At the end of our walk through the south side of the seaport in Port-au-Prince, he was fighting back the tears. So was I.

An Emotional Rollercoaster

As it was with Jocelin, it seemed I experienced a predictable pattern across an emotional spectrum with every acquaintance I found—even in the new Haitian friends I made during the following weeks. Elation greeted every chance meeting, followed by the intensity of how the earthquake affected their lives, followed by shared grief and sorrow for those we both knew who were injured or lost.

What unbelievably followed the grief and sorrow were quick decisions on how we could help each other at that moment. Thankfully, that last exchange always brought back the feeling of interminable resolve to help all those here helping Haiti.

Getting Down to Work

I saw Jocelin almost every day until I returned to my duties back in Boston. Together, along with so many others, we quickly returned Haitian security guards to their posts and reinforced their efforts with U.S. military forces. We collaborated with the Haitian Coast Guard to get the necessary land-based and waterborne security resources to allow humanitarian and military cargo to begin flowing into the functional seaport facilities in the Port-au-Prince area, ultimately bringing critical relief supplies to the people of Haiti.

Though the complexities of his problems may have only slightly changed for the better, during the weeks I was there, I could see more focus, determination, and camaraderie in Jocelin's disposition. On the day I left, I gave him one of my pep talks, just like the old days. I left Haiti knowing I gave all I had to those whom I cared so much about.

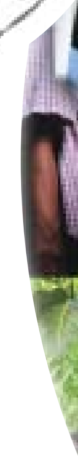
About the author:

CDR Daniel Deptula is Commanding Officer of the Maritime Safety and Security Team in Boston, Mass. He was the Deputy Planning Officer on the Department of Homeland Security Incident Response Team that deployed to Haiti.

A World Torn Apart

A USCG petty officer works to rebuild his investment in Haiti's future.

by PA3 Michael Anderson
Public Affairs
U.S. Coast Guard Deployable Operations Group



It was sunny and warm on Jan. 12, 2010, with a light breeze sweeping across the island. Just another normal day in Haiti. U.S. Coast Guard Boatswainsmate Chief Paul A. Cormier was scheduled to return to the United States in two days and was cleaning and organizing his Haitian home. He was descending the exterior stairs when a noisy vibration started.

"I thought a plane was crashing nearby," said Cormier. "I ran around the house to the front yard and grabbed onto a tree." The noise and movement grew louder and more forceful as Cormier clung to the tree.

A magnitude 7.0 earthquake was ravaging the entire island nation of Haiti.

"I watched as my wall separated at the corner fifty feet from where I was standing," Cormier said. "It fluttered back and forth like a flag and fell, all in one piece, onto the road." Blocks and concrete from the second floor crushed the path Cormier took to get to the front yard. He was in shock, but quickly recovered to begin the search for his boys.

"I began running toward the ocean to find my oldest son Nason," he said. "He had been playing soccer near the beach. When I saw him, our eyes met, and we ran towards each other and embraced."

Cormier still had not located his youngest son, Anack. As he was approaching the main dirt road in his search, Anack and his mother appeared. They were OK.

The History

The story of how this Coast Guard chief was in Haiti on the day of the earthquake began in 1994. He was a reserve member of Port Security Unit (PSU) 302 and was re-called to active duty to deploy to Haiti in support of Operation Uphold Democracy.

During the team's four-month deployment, his most significant engagement involved the local children. Often they would maneuver their dug-out canoes near PSU 302's security zone to find the best fishing spot or try to sell wood carvings to the Americans.

"The kids were teaching us to speak Haitian Creole," BMC Cormier said. "They would sing us Haitian folk songs and frequently ask us for 'food in plastic bag,' which was their name for meals ready to eat."

One day, Mitou, a young Haitian, tried to communicate with BMC Cormier, who didn't understand Mitou's rapid Creole. The next day, Mitou returned with a letter written in Creole saying his wife had given birth to a very sick baby boy and requesting that someone take a picture of the baby.

"All Mitou wanted was a photo to remember his baby by. He didn't think the infant would survive another week," said Chief Cormier. He asked Mitou why he didn't take his baby to the hospital. "He couldn't afford the $50 to be seen at the hospital," Cormier said. "So, I gave him the money."

During his deployment CPO Cormier provided hope, coordinated medical rehab supplies with U.N. representatives, distributed aid, and assessed the damage to his Haitian home. All USCG photos by PO Brandon Blackwell.

One year later, Cormier returned to Haiti to attend the baby's baptism. He was given Cormier's name, Ti Pol (little Paul), and is now 15 years old.

The Soleil Foundation

Since that first trip back, Chief Cormier helped provide funding to send the Haitian children he met to school. After awhile, other children asked if he could help them go to school, too.

"Rather than pay for all of these kids to go to school, I would just hire a school teacher and start my own school," Cormier said. So he built his first school. After a couple of years, the government of Haiti expanded its container yard, and most students moved to Leogane. He packed up his school to follow them.

In 2003, he found a piece of land that had the foundation of a house that was never completed. This became the headquarters for the Soleil Foundation, Cormier's non-profit charity, created to help alleviate poverty in Haiti through education. It would eventually have a depot, living quarters for volunteers, and meeting spaces.

Cormier solidified his tie to Haiti when he became the foster parent of two Haitian children, Anack and Nason.

An Ounce of Preparation is Worth a Pound of Cure

In addition to its main educational mission, the Soleil Foundation also sponsored events for the community. Providentially, these events included Community Emergency Response Team (CERT) training and certification. During one such event, Michigan Community Emergency Response Team members certified 20 villagers as CERT members.

That training was vital following the earthquake, when the local CERT members sprang into action, gathered medical supplies, and began treating people in the local villages.

Following the Quake

Two days after the 2010 earthquake, with the village stabilized, Cormier headed to the Port-au-Prince airport. The State Department had set up a check-in station and BMC Cormier was directed to a designated location, where he waited for further instructions.

After about 20 minutes, he saw a familiar face: USCG CDR Daniel Deptula, Commanding Officer of Maritime Safety and Security Team (MSST) Boston. "I asked him if I could be put on active duty orders," Cormier said. "I spoke Haitian Creole, and I know the area."

Deptula made a call and 20 minutes later, Cormier was given conditional permission to stay and become attached to the DHIRT. "His vast knowledge of Port-au-Prince, the culture, and his speaking ability were crucial components of the Coast Guard's success," said Deptula.

Missions Accomplished

As the weeks passed, Cormier's abilities became more and more valuable. On one occasion, he served as the head translator for the commanding officer of the surgical ward aboard the U.S.S. *Comfort*.

Before MSST Boston returned to the United States, Cormier and the port security mission were turned over to PSU 307. While attached to the PSU, BMC Cormier served as the primary translator during joint projects with the Port-au-Prince port authority, such as bringing their small boat fleet back online. He was then transferred to the Joint Information Center-Haiti where his knowledge of the country and its people once again proved invaluable.

Now the Homework Begins

Once he completes his active duty orders, Cormier will once again have to juggle his time between his homes in Michigan and Haiti.

"I have to start the rebuilding process for our village," Cormier said. "We lost several homes, our school, and two bridges, which all need to be rebuilt so we can move forward."

The next several months will be challenging for Cormier. He can only stay a few weeks at a time before he must travel back to his home in the United States. "I love this country," he said. "I have family here. They need me, and I need them."

About the author:

PA3 Michael Anderson is the public affairs specialist at the Deployable Operations Group in Arlington, Va. His previous tours include duties at Pacific Area Public Affairs and aboard the Coast Guard cutter Decisive*. Petty Officer Anderson has been awarded two Achievement Medals, a Commandant's Letter of Commendation Ribbon, and a Meritorious Unit Commendation.*

Devastation, First-Hand

by CDR JOE ALTHOUSE
Deputy Chief of Maritime Operations
United Nations Stabilization Mission in Haiti

The earthquake hit us at about 4:45 in the afternoon on Jan. 12, 2010. I was in my office at the United Nations Stabilization Mission in Haiti headquarters, where I work as a deputy chief, when I heard a dull rumble.

The building moved violently as I struggled to get my footing. My desk lurched in one direction, then another. A file cabinet shifted in front of the door, blocking the exit. With the help of another U.N. officer, I moved the cabinet and stepped out into the hallway.

Headquarters Collapses

The main part of the building—the old Christopher Hotel—had collapsed, blocking the only normal egress from the building. Together with a French officer, we cleared the floor, escorting people to a window, where others outside helped them to the ground.

An officer from Argentina and I then found an extension ladder. Together we managed to evacuate about another 30 people from the floor above us. After clearing these evacuees, I began walking around the building. I encountered about 200 people outside the building, covered in cement dust. Most were stunned, shocked. Many were badly injured, but luckily, many survived.

I saw many Haitian nationals who work with us, and whom I had befriended. They were hurt. They had lost their homes and loved ones, yet were so happy to see me. I was struck by such selfless behavior. Imagine: They lost everything, but they were happy to see that I was OK.

The First Days

Over the next two or three days, the bodies of the dead were brought out to the street and laid on the sidewalk. Some were covered, some not—survivors just didn't know what to do, as many were family and friends.

Three days after the earthquake, I heard from a friend I met in 2007. He was in the Dominican Republic, but his family was in Haiti when the earthquake hit. He lost them all when their house collapsed.

"I guess I'll just have to start all over again," he said. "It will be OK." His calm acceptance is typical of the people here, who have suffered so much, and sadly now have suffered even more.

Aid Continues

Since the earthquake I have been assigned as a liaison to the joint task force sent by the United States to support humanitarian assistance and disaster relief activities. The massive infusion of aid provided food and shelter for tens of thousands of survivors. Just over one month after the quake, I finally had a place to sleep and shower.

The World Food Programme launched a remarkable effort to feed two million people in 14 days. At day six, we fed well over half a million people, a little more than 100,000 each day. The operation ended on Feb. 13, 2010, having reached more than 2.2 million people. An additional six-day phase was added on Feb. 14, with a focus on providing aid to children and pregnant women.

About the author:
CDR Joe Althouse served as the Deputy Chief of Maritime Operations for the United Nations Stabilization Mission in Haiti.

Restoring Communications

Helping Haitians help themselves.

by LCDR John McClain
Deputy Division Chief, Communications and Security
U.S. Coast Guard Deployable Operations Group

Following the Haiti earthquake, communications were devastated as the majority of the wireline infrastructure was destroyed. American citizens in country had limited ability to contact U.S. resources for emergency assistance. The national cellular providers reported anywhere from 30 to 70 percent loss of towers in and around the Port-au-Prince area.

My team was tasked with providing communications for the Department of Homeland Security Integrated Response Team (DHIRT) and Joint Information Center, but this role soon expanded to fulfill the communications needs for the first-responder urban search and rescue teams.

Talk to Me

Restoration of essential emergency communications systems was critical to saving lives, maintaining the health of the population, and delivering emergency and humanitarian assistance in a secure environment for U.S. and international aid workers.

Group leaders for the mission to restore the island of Ile de la Gonave "high site." From left, Mr. Jean Paul Stevenson; LCDR John McClain; Officer J.C. Julien, HNP; Mr. Gilbert Elie, HNP; Mr. Allan Benoit, HNP; and (kneeling) Mr. Christopher Watness, Voilá Cellular. U.S. Coast Guard photo.

In short, everything depended on re-establishing communications.

We started a coordination and resource allocation cell and developed a cross-functional communications team, partnering with civilians and other military members. We held meetings every evening to discuss the day's events, evaluate our progress, and decide on deployment and tasking for the next operational period.

Equipment and repeater systems our teams deployed in the early days of the response were directly credited with saving nearly 100 people who were pulled from collapsed buildings.

After this initial response phase, one of the first steps was to survey the damage. The Federal Communications Commission sent a team to assess the state of Haitian telecommunications infrastructure including landline, cellular, fiber, and national police communications. Reporting back to an intergovernmental coordination group led by the National Communications Coordination and Intelligence Center, these assessments would be used in the final analysis and restoration plan for the U.S. response effort.

The surveys showed:

- All landline communications in and out of Port-au-Prince were inoperable.
- The undersea connection to the Bahamas was cut.
- Two major wireline switching locations were damaged.
- Haitian police headquarters was no longer inhabitable.
- Internet service infrastructure was damaged.
- the Haitian National Police's (HNP) primary "high site" on the island of Ile de la Gonave, which provided about 70 percent of the dispatch communications coverage, was down.

Address the Mess

After meeting with the HNP lead communications director, we gathered equipment and boarded two CH-53 helicopters with more than 30 personnel including U.S. Marines, Haitian National Police, and cellular technicians from Voilà, one of the main cellular providers. On Il de la Gonave, we were greeted by more than a hundred Haitians who promptly volunteered to help move the gear, including a 1,300-lb. generator, 25 car batteries, inverters, cables, a 500-gallon fuel tank, and eight 55-gallon drums of fuel.

Working all day, we set up the generator, replaced all batteries, connected inverters, set up and fueled the tank, and tested radios. At the end of the day, power was restored at the site and we left it operating.

Brokering Communications

After restoring the primary high site, we activated the HNP's secondary call center to replace the ravaged primary call center. The challenge was brokering an alliance among the cellular companies, the Conatel, and the Haitian National Police that would provide all of the necessary resources, including manpower, equipment, and funding. If successful, we could provide basic emergency response capability.

Through the diplomatic brokering efforts of the communications team, the cellular companies reported progress: Two completed programming and routing tasks (and the third was not far behind), while HNP personnel were answering calls as they came in.

Surveying the damage. From left, LCDR John McClain; Mr. Christopher Watness, Voilá cell phone company; Chief J.J. Aldephonse, Haitian National Police; and Mr. Gilbert Elie, Haitian National Police Communications Advisor. U.S. Coast Guard photo.

I participated in negotiations with the cellular carriers. Even though those negotiations only encompassed about a week's worth of work, the team's success was essential to the people of Haiti.

Follow-Up

On February 18, 2010, I received word from our Haitian cellular and National Police partners that they had just finished final work. The programming, cross-connects, and final preparations provisioning and manning the call center at the Haitian National Police site were finished as well. The cellular workaround and call center was functioning, and everything tested well.

About the author:

LDCR John McClain is the Deputy Division Chief of Communications and Security for the U.S. Coast Guard Deployable Operations Group.

Marine Transportation System Recovery Unit Haiti

by CAPT John Little
Deputy Sector Commander
U.S. Coast Guard Sector Hampton Roads

Shortly after the earthquake that struck the heavily populated capital of Haiti, members of a collateral duty Marine Transportation System (MTS) Recovery Assist Team converged on Coast Guard Air Station Clearwater Florida to deploy to Haiti for humanitarian response operations.

Flights into the Port-au-Prince airport were tightly controlled to prioritize humanitarian aid cargo. The 12-member team was not granted one of the slots. Instead, we had to travel through Providenciales on the islands of Turks and Caicos via a C-130 airplane and enter the bay of Port-au Prince via Jayhawk helicopters.

Mission: Port Restoration

The team formed into an MTS Recovery Unit, a specialized incident management component deployed to assess the commercial infrastructure and assist the port authority, shipping partners, and port stakeholders in establishing the flow of humanitarian aid into the nation's primary international port. Once established, efforts would shift to the restoration of normal day-to-day shipping that was so essential to the economy of the nation.

The earthquake in Haiti that rocked the ports in the bay of Port-au-Prince destroyed much of the shoreside infrastructure and significantly disrupted the government agencies with maritime transportation responsibilities. Additionally, all of the Haitian national port authority and customs officials, pilots, agents, and vessel and facility operators were experiencing their own personal tragedies. In many cases, these partners, who were already diligently working to remedy their nation's crisis, were also dealing with the loss of family members or their homes.

Multi-mission Deployment

Marine Transportation System Recovery Unit team members were drawn from throughout the Coast Guard and chosen for their specialties. Atlantic and Gulf Strike Team members from the Deployable Operations Group would work with facility owners, terminal managers, and private contractors to rapidly assess critical facilities necessary to accept cargoes. The team would concentrate on strategies to enable cargo transfers at the south pier without further damaging it.

Senior-level officers with National Response Framework/Unified Command expertise and the Coast Guard's International Port Security Liaison Officer, who had already cultivated relationships with the Haiti national port authority and other key stakeholders, reconnected with them to integrate the MTSRU team. Trained recovery staff would also be tasked to control vessel traffic and maintain situational awareness of humanitarian and traditional cargo throughout the response.

Coast Guard Jayhawk helicopters delivered the team to USCG medium-endurance cutters in three-person loads and provided area familiarization over-flights. The over-flights confirmed that the north pier had completely collapsed, taking the entire offloading infrastructure with it. The south pier also showed signs of damage—half of its extension disappeared into the water, leaving only the main structure standing. This rendered the nation's primary port only partially available, with a greatly reduced shipping capacity that diminished the ability to handle the much-needed humanitarian aid.

Port Assessment

The unified command structure in Port-au-Prince was known as Joint Task Force-Haiti, and the MTSRU was attached to its port survey and assessment branch to conduct port survey and assessment, control vessel movement, and develop an understanding of what was necessary to ensure the port's viability and provide courses of action to re-establish normal shipping.

On day one of Marine Transportation System Recovery Unit support, senior leadership engaged with key stakeholders to establish the contacts necessary to operate the port. These local experts included the national port authority, customs, shipping agents, pilots, and military and other port leadership.

It wasn't enough to address the inbound aid and military packages; the leadership had to negotiate a way to open up the storage yards and get the containerized cargo moving out while maintaining the income generated by the shipping industry to fuel the economy. Throughput of cargo and aid quickly became the benchmark of success, and a skilled liaison officer teamed with the Navy joint operations center to ensure a coordinated effort.

RDML Roy Nash receives a briefing regarding port recovery efforts from LCDR Mark Gibbs, with the Maritime Transportation System Recovery Unit. U.S. Coast Guard photo by Petty Officer Eric J. Chandler.

Offloading Supplies

Meanwhile, the shore team set about developing an offload plan for the humanitarian aid-laden barge *Crimson Clover* by teaming with naval engineers to find ways to reduce stress on the fragile pier. Marine safety officers positioned loading ramps to best maintain its stability. Soon trucks were moving freight efficiently off the barge, offloading approximately 123 containers of aid. The barge was then moved out to allow other aid to enter the port.

Simultaneous with this operation, MTSRU Strike Team specialists inspected bulk fuel facilities that were scheduled to receive shipboard transfers that would power the grid, fuel the aid delivery trucks, and run the generators. By day two, strike team members conducted assessments of both bulk fuel facilities at Varreux and Thor terminals.

The Marine Transportation System Recovery Unit then inspected the exposed pipelines, liquefied petroleum gas storage facilities, and oil storage tank farms. Working with the knowledgeable and resilient local facility teams, repairs were quickly underway. By the end of the day, the tank truck loading operations at Varreux Terminal were operational.

Shortly after the first week, the first petroleum vessel and liquefied petroleum gas carrier successfully delivered their much-needed cargoes. This cooperative effort played out day after day as humanitarian aid flowed through the port and to the Haitian people.

Smaller Ports

With the Port-au-Prince south pier now re-established, it became necessary to conduct port assessments on the smaller ports throughout Haiti to increase throughput. Despite the south pier being open for business, the local infrastructure was damaged to the extent that the capacity to receive the cargo exceeded the ability to distribute it beyond the port. By assessing the capability of the smaller ports, certain ships could be re-routed to locations where land-based infrastructure was conducive to faster offloads, thereby enabling the aid to reach victims more efficiently.

Teams quickly identified favorable ports and MTSRU assessments translated into options for the successful delivery of aid. In certain cases, some of the smaller port facilities had already returned to business as usual and the additional shipping provided new local jobs.

All told, nearly 200,000 barrels of oil, more than 3,000 pallets of supplies, 1,000 tons of medical materials, and 2,200 containers were processed during this effort, totaling more than 380,079 lbs. of cargo.

Continuing Benefits

The situation in Haiti created special challenges for the Coast Guard, Department of Defense, and other response organizations. While marine transportation system planning has been extensively completed for American ports, none had been completed for foreign ports, nor had a foreign response been anticipated.

Senior-ranking military officials lauded the interagency cooperation that will reap benefits for the Coast Guard and the Department of Defense (DOD). The integration of Coast Guard skill sets into the extensive DOD resources that normally conduct international response had never been planned for. Much of the credit for the success of this mission is owed to USCG cutter *Oak*, which hosted the MTSRU during the early response, providing much-needed computer connectivity and waterside pier security. Additionally, the *Oak's* crew supported the effort in numerous ways, including setting additional aids to navigation and managing the USCG's vessel traffic service that monitored and queued vessels for mooring in and around Port-au-Prince.

About the author:
CAPT John Little has served in the Coast Guard for 27 years. He has served aboard five cutters, commanding three, including the icebreaking buoytender USCGC Mackinaw. *He holds a B.S. in business administration from the University of Tennessee at Chattanooga.*

Coast Guard Crisis Communications

by CAPT James B. McPherson
Commander
U.S Coast Guard Sector Northern New England

Just 11 hours after a devastating 7.0-magnitude earthquake, a Coast Guard ensign flew high on the mast of a 270-foot medium-endurance cutter in Port-au-Prince Harbor. The aptly named Coast Guard Cutter *Forward* had arrived.

Media personnel were also swarming to the site of this "breaking" story to broadcast the news to millions of viewers around the globe who expect instant information.

The Communications Mission

The U.S. government had to demonstrate it understood the severity of the situation, and was diligently working to bring in relief workers, medical supplies, and shipments of fresh water and food for the millions displaced by the earthquake. Like the images broadcast in the aftermath of Hurricane Katrina, it was important to show Coast Guard helicopter, cutter, and small boat crews evacuating critically injured Haitian citizens and transferring supplies.

But the entire infrastructure in Port-au-Prince was destroyed and communication modes we take for granted, such as e-mail or telephone service, were on the brink of collapse. How could we provide this information to a waiting and watching world, and how

Lester Holt and camera crew observe as a critically injured Haitian child is transferred from a Haitian Coast Guard small boat to Coast Guard Cutter *Tahoma*. U.S. Coast Guard photo.

could we communicate with the population and with each other in support of this effort?

Joint Information Center

Concurrent with the ongoing response efforts, the U.S. Agency for International Development and the Department of State combined communications with the Department of Defense (DOD)'s Joint Task Force-Haiti to form USG Haiti JIC—the U.S. Government Haiti Joint Information Center—one of the largest joint information centers ever assembled. The team quickly organized at the U.S. Embassy and coordinated an aggressive integrated communications effort.

The primary communications goal was for the U.S. government to speak with "one voice" on the relief effort. While USG Haiti JIC quickly accomplished that, as the crisis emerged it became clear that the U.S. government would also have to assist the Haitian government in communicating critical relief information.

Broadcasting and Receiving

U.S. Department of Defense forces and Department of State teams provided fuel, generators, and transmission towers for local Haitian radio stations. Once back on the air, they were able to broadcast vital information, including:

- the locations of food sites,
- information on earthquake-proofing emergency shelters and tents,
- information on debris removal,
- information regarding visas for Haitian Americans.

Transmitting the information was important, but the Haitians had to be able to receive the messages, as well. In response, DOD assets distributed more than 60,000 solar and hand-cranked radios. In addition, critical Coast Guard messages to prevent mass exodus and overcrowding ferries were broadcast in Creole from special DOD aircraft flying over the coasts.

Communication Lessons Learned

There were four valuable take-aways:

- Get the message out quickly.
- Get the media out to witness responders in action.
- Shoot Coast Guard video of responders if media can't get to the scene.
- Leverage DOD communications assets such as digital video and combat cameras.

About the author:

CAPT McPherson's sea-going experience includes command of Coast Guard cutters Point Knoll, Maui, and Escanaba *and service aboard cutters* Seneca *and* Evergreen. *His public affairs deployments include assignment as press secretary to the principal federal official for recovery efforts following Hurricanes Katrina and Rita, lead spokesman for the Coast Guard response to the crash of TWA flight 800 in New York, and Coast Guard representative to the U.S. National Joint Information Bureau, Operation Joint Endeavor, in Bosnia-Herzegovina. During Operation Iraqi Freedom, he established the Coast Guard public affairs detachment at the Pentagon. At Coast Guard headquarters, Captain McPherson was chief of media. He was most recently deployed to the joint information center at the U.S. Embassy Port-au-Prince, Haiti, and is currently Commander, Sector Northern New England.*

USN Admiral Samuel Perez conducts a joint news conference with USCG personnel on the south pier in Port-au-Prince. U.S. Coast Guard photo.

NBC Nightly News Anchor Lester Holt returns with a CG helicopter crew after a flight over the Port-au-Prince Harbor. U.S. Coast Guard photo.

Lessons Learned

from Casualty Investigations

Arctic Rose

Valour

A regular feature in Proceedings: "Lessons Learned From USCG Casualty Investigations."

In this ongoing feature, we take a close look at recent marine casualties. We explore how these incidents occurred, including any environmental, vessel design, or human error factors that contributed to each event.

We outline the U.S. Coast Guard marine casualty investigations that followed, describe in detail the lessons learned through them, and indicate any changes in maritime regulations that occurred as a result of those investigations.

Unless otherwise noted, all information, statistics, graphics, and quotes come from the investigative report. All conclusions are based on information taken from the report.

Lessons Learned from Casualty Investigations

No Survivors

A fishing vessel meets a mysterious end in the Bering Sea.

by Ms. Krista Reddington
Technical Writer

Everyone loves a mystery—the suspense, the puzzle, the excitement—all leading to the final reveal. Everyone, that is, except the Coast Guard when faced with the sudden disappearance of the *Arctic Rose*.

The death toll was high and there were precious few facts to analyze. Somewhere in the cold depths of the Bering Sea lay the clues that would lead to several theories concerning what happened to the ill-fated fishing vessel and its crew of 15. Through interviews and underwater explorations, the Coast Guard and its Marine Board of Investigation were able to piece together enough facts to come up with several scenarios that may account for the final moments of the vessel.

The Final Deployment

The vessel departed Dutch Harbor in Unalaska, Alaska, on March 22, 2001, after taking on 10,580 gallons of fuel and an unknown quantity of water. Six days later, it left Unalaska with a crew of 15 and made several trawls in the Slime Banks area of the Bering Sea, known for producing small amounts of yellow fin sole. On the last day of March, the vessel did not offload cargo but took on 3,591 gallons of fuel and another unknown amount of water at the last port of call—St. Paul, Alaska. After leaving St. Paul, the vessel sailed 36 hours to the Zemchug Canyon Bering Sea fishing grounds to participate in the flathead sole B season, which opened on April 1.

The April 1 flathead season lasted for three weeks and yielded sole containing valuable roe, which is marked for consumption in Asia and brings higher profits. As flathead sole are bottom-dwellers and remain on the sea floor during the day, the best time to catch them using trawling gear is during daylight hours.

Two trawl sets were made during the day on April 1. The first yielded very little marketable fish, but the second, completed around 8:00 or 9:00 p.m., produced a 50 percent flathead sole catch. The captain intended to remain in the vicinity to resume fishing in the morning and set the vessel for jogging at minimal speed in order to hold its position.

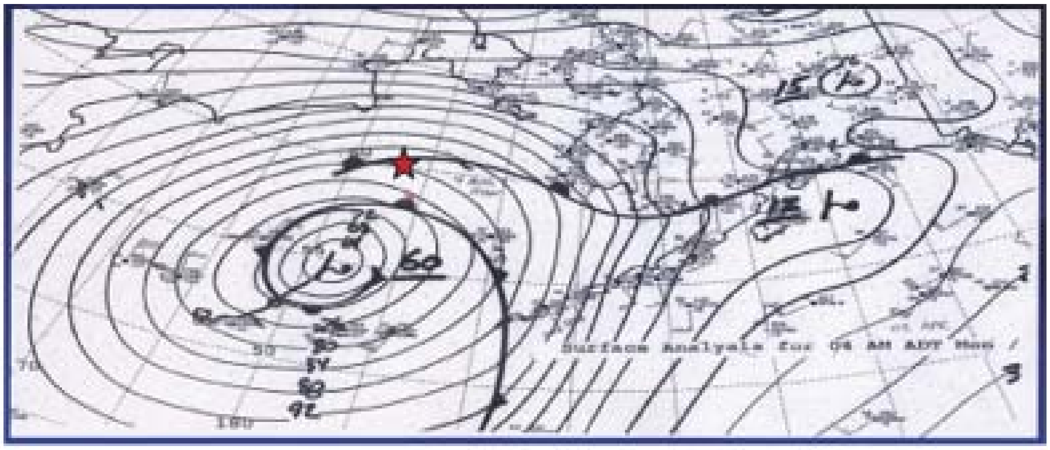
The vessel *Alaskan Rose*, owned and operated by the same company, was fishing within 10 to 15 miles of the *Arctic Rose* and the captains had spoken late in the evening of April 1. The captain of the latter vessel had expressed his irritation at the garbage that had been left in the processing space, clogging the chopper sump pump.

In a discussion of the day's events between the *Arctic Rose* captain and the other vessel's mate around 10:30 p.m., the captain did not report any mechanical problems or other concerns, and the problems with the sump pump had been resolved. The mate later testified that he last saw the *Arctic Rose* on radar around 11:59 p.m.

Vessel Versus Nature

The forecast from the National Weather Service (NWS) for 5:00 a.m. April 1 through 5:00 a.m. April 2 called for a gale warning, with seas building to 16-24 feet by the morning of April 2. The forecast covers a large area and can lead to ambiguous weather projections because of the lack of data buoys and weather stations in the Bering Sea region. The NWS generates forecasts that are conservative in nature in order to compensate for this lack of information and often call for more severe weather than actually occurs. Because of the cautious nature of the forecasts, fishermen tend to discount them.

A hindcast, which tested the forecast against the actual occurrence of the weather in the vicinity of the sunken vessel, was generated based on weather reports from the Coast Guard and other commercial sources operating in the region. The analysis showed that a significant weather event called a "triple point"occurred at the vessel's last known position. This is an area of a frontal system where a cold, warm, and occluded front join together, and is usually associated with severe weather. It is likely, based on the triple point, that the vessel experienced these three distinct weather patterns in a short period of time.



National Weather Service surface analysis for 4 a.m. on April 2, 2001. The red star indicates the approximate position of the Arctic Rose. Graphic courtesy of the National Weather Service.

It is also possible that conditions were further complicated by another phenomenon known as micro-weather, characterized by localized severe weather that can be experienced in one area, but not by other vessels nearby. Micro-weather would also produce confusing seas that would make it difficult for watchstanders to predict wave patterns and height. The hindcast from the NWS shows that the weather at the time of the casualty was worse than had been forecast.

A Call for Help

The command center of Coast Guard District 17, Juneau, Alaska, received an Emergency Position Indicating Radio Beacon (EPIRB) notification via telex at 3:35 a.m. on April 2. Having identified the EPIRB as belonging to the *Arctic Rose*, the watch supervisor called the Seattle, Wash., representative for the vessel's owner and requested that he contact the vessel to determine whether the alert was a false alarm. The representative called back to inform the command center that he had been unable to reach the vessel by either phone or e-mail, so the command center issued an Urgent Marine Information Broadcast (UMIB) to alert all vessels to be on the lookout for the fishing boat and/or any survivors.

After being informed that the *Alaskan Rose* was in the vicinity, Coast Guard Communications Station Kodiak unsuccessfully attempted to contact that vessel. Air Station Kodiak launched a C-130 at 4:00 a.m. to begin the search for the missing vessel while the C-130 and Communications Station Kodiak continued to try to contact it, without success.

Shortly before the C-130's arrival on scene at 7:30 a.m., contact with the *Alaskan Rose* was made via VHF radio. The mate informed the crew of the C-130 that he had not heard a "mayday" or other call for assistance from their sister vessel and altered his own vessel's course to intercept the EPIRB after immediately waking the captain to inform him of the situation. As they traveled the 11 miles south to the EPIRB position, the mate continued—unsuccessfully—to try to hail the other vessel on VHF radio.

Captain Recovered

Approximately one hour after receiving the Coast Guard transmission, the *Alaskan Rose* entered a debris field and the crew spotted someone wearing an immersion suit in the water. They recognized him as the

Photograph of the *Arctic Rose* taken during the remote operated vehicle expedition. U.S. Coast Guard graphic.

captain of their sister ship and attempted to hail him, but he was unresponsive.

The mate donned an immersion suit, attached himself to a safety line, and entered the water to rescue the captain, but the tether was too short and he was unable to reach the man in the water. Unhooking his safety line, the mate swam the distance to the captain and pulled him back to the vessel. The crew threw a ring buoy to the mate and hoisted him and the captain aboard, where they began to administer CPR to the unresponsive man.

A Vessel with a Story

The *Arctic Rose* was a stern trawling fishing vessel with an extensive history that came to an abrupt end on April 1, 2001. Originally constructed in 1988 in Biloxi, Miss., the vessel operated as the shrimp boat *Sea Power*. As there were no plans available, it is unknown what construction methods were used and whether the vessel was constructed within the recognized standards.

In the early 1990s, the vessel was relocated to New Bedford, Mass., and was modified to dredge for scallops. Again, there is a lack of plans for the modification, though pictures taken by a marine surveyor reveal plug welds installed in the heavy doubler plates on the port and starboard sides and the stern. It is thought that this adjustment was likely installed in order to protect the sideshell from the scallop dredge banging against those areas of the hull.

The *Sea Power* was purchased in 1991 and again modified, this time to work in the head-and-gut (H&G) and freeze industry in Pascagoula, Miss. Several modifications were made to the vessel at this time:

- A shelter deck, housing fish processing equipment and extending aft from the house on the main deck, now covered about two-thirds of the aft working deck.
- A gantry and net reel, for trawl operations, was added at the stern.
- The live fish hold was transformed into a cargo hold, which was outfitted with a refrigeration system and insulated with spray-on urethane foam.
- A concrete deck was poured to level the deck and to serve as insulation from the shaft alley running through the cargo hold.

The changes were reviewed by a naval architect who conducted an inclining experiment on Dec. 11, 1991, following the completion of the majority of the work. A stability book, which incorporated the processing space as a part of the vessel's watertight envelope and requiring it to be weathertight when the vessel was underway, was issued to the owner.

The vessel was renamed *Tenacity* and continued to operate as an H&G processor. The vessel had experienced constant engine, equipment, and shaft and trawl problems as the *Tenacity*, which contributed to the owner filing for bankruptcy in 1996. The vessel was removed from service and remained in lay-up status for more than two years at Fisherman's Terminal in Seattle, Wash.

The *Tenacity* was purchased in March of 1999 and rechristened the *Arctic Rose* on June 25, 1999. Under the new owner, the vessel underwent additional modifications:

- The existing gantry was removed and a new, larger, "A"-frame gantry was installed.
- A Cummings generator was installed in the engine room.
- Six-inch pipe guards were installed on the upper deck in order to center the trawl net.
- A refurbished propeller and intermediate shaft were machined and installed.
- The processing space was overhauled and all old equipment (except for two plate freezers) was removed.
- Tsurimi and Vaughn sump pumps were installed on the port and starboard sides of the processing area.
- The deck of the processing area was installed with new fiberglass grating and steel framing (at a minimum of five inches off the deck).
- The by-catch chute was raised to four feet above the deck and fitted with a manual guillotine closure, and the waste overboard chute was raised to five feet off the deck and outfitted with a flopper door.
- The refrigeration system was overhauled.
- New stainless steel equipment was installed, including: a packing table with scales, wash tanks with incline conveyor, bleeding bins, bleeding bin conveyor with incline conveyor, sorting belt with incline conveyor, break tank gutting belt heading machine, dump box with incline conveyor and hydraulic sliding hatch, and bleeding bins with three hydraulic doors.
- The port and starboard refrigerant accumulator tanks and the related piping were removed from the weather deck, and the accumulator tank was removed from the auxiliary machinery space.
- Two 8-foot by 4-foot low side receivers and associated control panels and piping were installed in the auxiliary machinery area.
- In order to accommodate a new pan plate freezer that was installed in the processing space, another pan plate freezer was moved several feet to the starboard side and the piping was modified.

The captain was fully clothed, wearing boots, and his immersion suit was filled with water. The crew made several cuts in the suit to administer emergency medical treatment, thereby eliminating any chance of determining the means by which the water had entered the suit. The captain's body was later taken by the Dutch Harbor police department and turned over to the Alaska State medical examiner in Anchorage for autopsy, which showed no use of drugs or alcohol and revealed the cause of death to be salt water drowning.

A Desperate Search

For the next 36 hours, the crew of the rescue vessel searched for survivors. Several miles south of the debris field, they came across an inflatable life raft belonging to the vanished fishing boat; it was right-side-up and empty. After several failed attempts to recover the life raft and with the weather beginning to worsen, causing a hazard to their lives, the C-130 commander directed the vessel's crew to destroy the life raft. Holes were sliced into the flotation chambers and the raft sank into the depths.

Two crewmembers later testified that, during the rescue efforts, they spotted a person in the water. One man testified he had seen someone wearing a white shirt and dark pants, while the other saw a dark shirt or jacket and dark pants. Based on the descriptions, which revealed they had seen two different individuals, the families were able to identify one of the men, though both bodies had slipped beneath the waves before they could be retrieved.

As there was nothing for them to recover on the surface, the Coast Guard conducted two expeditions using a remote operated vehicle (ROV) to collect data for the marine board's investigation. The marine board began the first operation in mid-July. The expedition contracted a Klein 500 sonar and a Phantom HD2 ROV. The sonar located a large contact during its third pass over the search area. Several additional passes were used to determine the size of the debris field and the position of the vessel.

ROVs Provide Eyes Under Water

Early in the morning on July 18, 2001, the ROV, equipped with a video camera, was lowered to the area where the vessel had been found. The sunken vessel was seen sitting upright under 73 1/3 fathoms (well over 400 feet) of water approximately 200 miles northwest of St. Paul, Alaska.

As the ROV maneuvered up the port side of the hull, the name of the vessel was once again seen by human eyes. The multicolored polypropylene lines that were used to mend the trawl net had unraveled from the vessel and the lines were sucked into the propellors, entangling the remote operated vehicle. Efforts to free it caused the umbilical cord to part, and the ROV was lost.

The second expedition began in the middle of August with a more powerful ROV. As the vehicle surveyed the wreck, examining the hull above and below the waterline as well as the port side of the pilothouse and the aft deck area, it found the following:

- The hull of the vessel was intact.
- The pilothouse was undamaged and all visible windows were intact.
- The rudder was hard to port.
- The trawl doors were missing and the trawl net was on the reel with the cod end in the dump box.
- The starboard overboard chute was partially open.
- Wires were spooled on the trawl winches and trawl gear, wires, and mud lines had shifted to starboard.
- Plow marks aft, where the vessel's kort nozzle made its initial impact, indicate that the vessel landed on the sea floor, stern first.
- There was no evidence of explosion or fire.
- The vessel was not fishing at the time the casualty occurred.

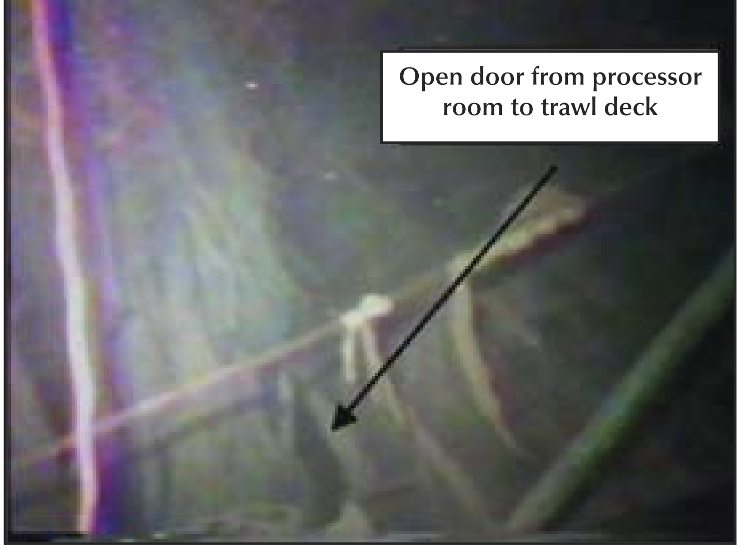
Vessel Stability

An inclining experiment was performed on March 31, 1999, to calculate the lightship displacement and center of gravity for the vessel and to create operating limits for the vessel. The test was conducted by a representative of a naval architecture and marine engineering firm with only two weight movements rather than the standard of three weight movements recommended by the American Society of Testing and Materials. The naval architect conducting the experiment explained that it was normal practice for uninspected fishing vessels to be treated differently than inspected vessels.

An independent review of the marine consultant files indicated that a third weight movement would not have changed the outcome or altered the conditions of the stability letter. Between July 9, 1999, when the operating instructions were issued, and April 2, 2002, there were a number of weight additions, relocations, and removals performed on the vessel. These alterations were not tracked by a naval architect to evaluate the weight changes on the vessel's stability (see sidebar "A Vessel with a Story").

Contributing Regulatory Failures

At the time of the casualty, the vessel was not in compliance with the operating instructions. The second ROV survey revealed that the aft starboard door in the processing space was open and the guillotine closure for the starboard discharge chute was more than half open. Both conditions prevented the processing space from being weathertight.



ROV photo of open weathertight door on aft bulkhead of processing space. U.S. Coast Guard graphic.

As the vessel used water in sorting and processing fish, it was required to have an interlock installed to prevent flooding of the processing space. Testimony from several witnesses indicated they had seen processing water left on, or the pumps in the processing space clogged with debris, which allowed the space to flood. It is possible that, based on this testimony, the interlock system was either non-existent or not functional.

Testimony from an engineer indicated that the double-bottom fuel tank had been used as a day tank and was refilled at the beginning of each day. When the vessel sank, there were between 9,500 and 12,000 gallons of fuel aboard, and 53,000 lbs. of product, stores, and ballast in the fish hold.

The maximum allowable deck load, according to the stability book, was 3,000 lbs. Though independent calculations later found the vessel met the intact stability criteria, the master of the vessel was able to evaluate whether his vessel met the minimum stability criteria only through use of the operating instructions. The average commercial fisherman is often unfamiliar with stability information because it is provided in several different forms (as there is no set industry standard) and is often difficult to read or interpret. Instead, they often determine vessel stability based on "feel." Therefore, the stability information on this particular vessel was left open to several interpretations.

Unraveling a Mystery

Because there were no survivors to recount the vessel's last hours or surface evidence to reveal what happened, the marine board requested the assistance of the Coast Guard's Marine Safety Center (MSC) to conduct an independent analysis to determine the most likely cause of the trawler's sinking. The MSC evaluated more than a dozen different scenarios that could have led to the loss of the fishing vessel and determined one to be the most likely.

They used the best estimate of the loading condition of the vessel at the time of the casualty as the baseline for all stability calculations. It is believed, based on the loading conditions as they were recreated using the analysis of data gathered during the investigation, that the vessel met the righting arm characteristic criteria and severe wind and roll criteria in NVIC 5-86, provided that the processing space was completely weathertight, as was required by the vessel's stability letter.

The Society of Naval Architects and Marine Engineers worked with the MSC to develop a progressive flooding analysis spreadsheet as a forensic analysis tool. Based on quasi-static time steps through various progressive flooding scenarios into as many as six interior compartments where large free surface "sloshing" effects[1] would negatively affect the vessel's stability, it was determined that the loss of the vessel was most likely caused by progressive flooding from the aft deck, into the processing space, through the door in the aft bulkhead.

The analysis suggested the vessel likely flooded rapidly forward through the open door in the bulkhead of the processing space, with the water then flooding into the galley and engine room through non-watertight doors. It is likely that the vessel lost all positive stability between one minute forty seconds and two minutes forty seconds, and sank in as few as four minutes six seconds after the progressive flooding began.

Several factors likely contributed to the accident: improper vessel operations and a failure to adhere to regulations, a lack of safety training for crewmembers who spent little time on the vessel prior to the last voyage, and a failure of emergency systems.

Vessel Operations

The vessel was engaged in head-and-gut (H&G) operations, in which the processors remove the head, either by hand or by guillotine, and the entrails before flash-freezing the fish. After the fish are frozen, they are bagged and placed in the cargo hold until they are offloaded. As H&G does not meet the regulatory definition of processing, the vessel was exempted from the processing vessel regulations found in 46 CFR, Part 28, Subpart F.

However, testimony from former crewmembers revealed the vessel did engage in processing by removing tails and fins, and therefore was subject to those regulations pertaining to fish processing vessels. The regulations require a class society or other qualified organization to conduct a vessel examination. A vessel cannot arbitrarily change its status from "non-processing" to "processing."

Testimony from former crewmembers revealed that when the vessel was ready to go to sea, last-minute hires were often required to fill vacancies. This policy was apparently prevalent aboard this vessel, since experienced processors were able to assess the production capabilities of the vessel by analyzing the size of the cargo hold and number of plate freezers and came to the conclusion that they would not make much money aboard the vessel. Former employees testified that crewmembers were often hired off the street or dock. In the case of the vessel's last voyage, three crewmembers were not documented for work in the United States (working under aliases), and 10 of the 15 crewmembers had been working aboard the vessel for less than three months.

Safety Observations Indicate Problems Aboard

Processors are not required to have basic safety training prior to accepting a position within the fishing industry. However, a safety orientation conducted by the master or other qualified individual is required to be provided when the processor reports aboard the vessel. As a vessel greater than 60 feet but less than 125 feet, it was required to have part-time National Marine Fisheries Service (NMFS)-certified observer coverage for 30 percent of its time fishing in each calendar year.

The last observer departed the vessel on March 21, 2001, and filed a brief that cited safety concerns ranging from occupational and workplace safety to vessel safety. The observer testified that acceptable abandon-ship drills were conducted on a weekly basis and stated that the vessel orientation was the best she had received as an observer. However, former crewmembers testified that the only safety training they had received was a brief introduction to the equipment and a short presentation on using the immersion suits.

Emergency Systems

Two ring buoys were mounted on the port and starboard weather deck bulkheads and the 20-person inflatable life raft was located on the roof of the pilothouse, forward of the mast, while signal flares were kept on the bridge in a watertight container. A wooden box on the port side held 17 immersion suits, each of which was equipped with whistles, waterlights, and retroflective tape. The vessel's EPIRB was mounted on the starboard side of the vessel, outside the weather deck. There it deployed at the time of the incident and emitted a signal that was received by satellite, which then forwarded the signal to the land station and sent it via phone line to the command center in Juneau, Alaska.

The vessel used an internationally utilized, semi-automated satellite service designed to distribute maritime safety information (MSI) to all types of vessels. Broadcasts are made over the INMARSAT-C system of geostationary satellites free of charge. The service is part of the Global Maritime Distress and Safety System (GMDSS) that provides for automatic distress alerting when a radio operator is unable to send an SOS or MAYDAY alert and also requires vessels to receive MSI broadcasts. The system also provides repeated distress alerts and an emergency source of power.

Two types of INMARSAT-C systems are sold for use aboard vessels: A GMDSS version and a non-GMDSS or "fisheries" version. While the two are very similar and provide comparable features, the fisheries version allows messages and safety broadcasts to be received and stored internally without notifying the operators that a message has been received. Both the *Arctic Rose* and *Alaskan Rose* had the non-GMDSS system installed in the pilothouse.

Technological Hiccup Waylays Distress Signal

On April 2 at 4:29 a.m., the District 17 command center in Juneau relayed the casualty vessel's distress information with a priority parameter of "distress" and a service parameter of "navigational warning."

However, a configuration in the system caused the message to default to a less urgent priority based on the service parameter, which is used to determine the system's response based on the settings and location of the vessel. There was no documentation that would indicate that the priority of messages would be determined by the service parameter, and users were not made aware that the system could default a message to a lower priority. This discrepancy was addressed in November 2001.

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Based on the findings of the ROV expeditions and witness testimony, the Marine Board of Investigations made several recommendations. Unless noted, the Coast Guard concurred with the recommendation and took action to implement.

Regulatory

- The Coast Guard should develop regulations requiring that all weathertight and watertight doors that are required to be closed, by the vessel's stability book, be alarmed and equipped with an audible and visual system in the pilothouse, indicating the position of the doors.[1]
- Vessels equipped with a processing space, or a space used in the sorting of fish in which water is used, should be fitted with high water alarms that sound in both the processing space and the pilothouse.
- The Coast Guard should re-evaluate the regulatory definition of processing vessels as it applies to fishing vessels and ensure that it includes head-and-gut operations.

Vessel Operations

- The Coast Guard should modernize the policy addressing weight changes and the need for a new stability letter to reflect the changes in technology and update the requirements.
- The Coast Guard and commercial fishing industry should establish a non-regulatory program to encourage vessel owners to track weight changes and other alterations that may impact a vessel's stability.
- The Coast Guard should distribute guidance regarding fishing vessel construction standards to minimize the free flow of water.
- The Coast Guard should remove provisions allowing the use of above main deck space in the development of fishing vessel stability characteristics.[2]

Safety and Training

- The fishing industry and the Coast Guard should investigate the development of a minimal safety indoctrination program for first-time crew members, including processors, and provide a means to document training.[3]
- The Coast Guard should encourage the use of color graphic displays instead of complex numeric formats in stability books to ensure that they are easily understood by mariners.
- The Coast Guard and NMFS should develop a memorandum of understanding to encourage the exchange of safety information gathered by observers serving aboard fishing vessels. A similar MOU should be developed between the Coast Guard in D17 and the Alaska Department of Fish and Game.[4]
- The Coast Guard and the Society of Naval Architects and Marine Engineers should develop workshops on regional stability and damage control that focus on fishing vessels operating within their regions.
- The Coast Guard should circulate a policy to ensure the preservation of all evidence collected on the scene of a marine casualty and establish guidelines to improve the process of selecting members of a Marine Board of Investigations.

Communications

- All fishing vessels operating beyond the boundary line should be GMDSS compliant. The Coast Guard should partner with the Federal Communications Commission (FCC) to develop these regulations.
- The Coast Guard and the FCC should require fishing vessels equipped with a GMDSS system to have a properly trained operator.
- The Coast Guard should develop a long range automated information system that incorporates two-way communications for vessels equipped with a GMDSS satellite communications system, thus providing the Coast Guard with information on the location and identity of vessels operating in U.S. waters. This system could facilitate rescue coordination by providing the location and identity of vessels and two-way communications capability to direct resources to the scene of a vessel in distress.[5]

Endnotes:

As noted in the Marine Board of Investigation official report:

1. We concur with the intent of this recommendation. We believe that the fitting of watertight and weathertight doors, required to be closed by a vessel's stability booklet, with alarms and status indicators would improve fishing vessel safety by making masters and crews more aware of the status of their vessel's watertight integrity and alerting them to possible threats of flooding. However, we believe that the development and implementation of a voluntary compliance program rather than attempting to publish regulatory requirements is more appropriate and more likely to be completed faster and with better success. We will consult with the Commercial Fishing Industry Vessel Safety Advisory Committee and work with the industry on the development of appropriate voluntary standards and seek to include the results in an update to Navigation and Vessel Inspection Circular 5-86, Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels.
2. We concur with the intent of this recommendation. Incorporating the weathertight envelope in stability analyses provides an accurate measure of a vessel's stability so long as operational practices do not compromise the spaces' integrity. We believe removing the provisions that allow for the use of main deck spaces that are part of the weathertight envelope would be overly restrictive. However, there may be a need to amend the existing provisions to reduce the likelihood that the integrity of spaces above the main deck spaces that were used in stability analyses could be compromised due to operational practices or other factors. We will include this issue in our review of Navigation and Vessel Inspection Circular 5-86, Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels, and update its guidance as necessary.
3. We concur with the intent of this recommendation. Requirements for safety orientations to be given to each individual on board who has not received the instruction and has not participated in required drills, including first-time crew, already exist in 46 CFR 28.270(e).9 46 CFR 28.270(f) provides the minimum requirements for safety orientations. We are currently working on a regulatory project that will propose requirements for the documentation of training and drills.
4. We concur with the intent of this recommendation. We agree that the exchange of safety information obtained from observers would be extremely valuable in our efforts to improve the safety of fishing vessels; however, the development of a new memorandum of understanding (MOU) may not be necessary. As we continue discussions with the National Marine Fisheries Service (NMFS) on this issue, we will consider the possibility of expanding the existing MOU between the U.S. Coast Guard and NMFS, developing a new MOU as recommended, or other means to facilitate the information exchange.
5. We partially concur with this recommendation. Systems already exist with the capabilities described in the recommendation. We are currently working at the International Maritime Organization to select appropriate systems to be used internationally and to establish standards and requirements for the equipment on board vessels. Once the work at the IMO has been completed, we will evaluate the feasibility of adopting those requirements for U.S.-flagged fishing vessels.

Coast Guard Communications Station Kodiak maintains a live 24-hour watch to monitor all high-frequency (HF) communication and digital selective calling (DSC) distress and safety frequencies for the North Pacific region. Had the *Alaskan Rose* been equipped with a GMDSS DSC-equipped single sideband radio, the communications station may have been able to trigger an alarm on the vessel to initiate communications. DSC was designed to allow a receiver to scan the safety and distress channels despite any noise associated with HF.

The INMARSAT-C aboard the *Alaskan Rose* did not have an audible or visual alarm to notify the watchstander of an incoming urgent message; he would have had to go from the steering station to the INMARSAT-C unit to download the message. That evening, the vessel received several messages from Russia, but the distress message from its sister ship was not received until several hours after it had been sent by the D17 command center.

Recreating the Tragedy

The layout of the vessel increases the likelihood of the progressive flooding from the processing space. The door leading from the processing space to the aft deck was far outboard on the starboard side, which would have reduced the heel angle at which water would enter the processing space. The doors leading forward into the galley and engine room were also located on the starboard side. The angle to starboard caused by the inflow of water through the aft door combined with the free surface effect inside the processing space would cause the water to spill forward into the galley, into the engine room, and eventually into the fish hold.

Three likely causes of progressive flooding into the processing space were established using the analysis:

- a wash-up hose left on or the water supply from the plate freezers may have caused the processing space to flood internally,
- the processing space could have flooded by boarding seas flooding from the aft deck,
- the space could have flooded through the open aft door if the vessel had rolled to starboard by at least 23 degrees.

No matter the means by which the water entered the processing space, the subsequent stability would have been reduced and the flooding continued until the vessel sank. Had the processing space been weathertight, as required by the stability book, the vessel would not have sunk.

Since casualties are usually caused by a series of events rather than just one catastrophic event, the marine board believes it is likely that the vessel was in the process of turning or was jogging downwind with following seas when it capsized to starboard. The position of the rudder left hard to port suggests a natural human reaction to correct for a starboard list. However, this action would prolong or increase the list and allow sea water to initially enter the vessel through the open weathertight aft door. The vessel likely remained heeled to starboard until the rapid progressive flooding sank the vessel.

A Lesson for the Future

The tragedy that befell the vessel could have been prevented had the crew been properly trained to follow safety and stability guidelines and had all communications systems been working correctly. The families of the men lost at sea had the opportunity to review the findings of the marine board and so were able to learn as much as possible about the events that transpired.

Though the loss of life and property can never be considered in a positive light, it is the hope of many that the lessons learned from this misfortune will help save the lives of future vessel crews as they engage in the dangerous profession of fishing near the Arctic Circle.

Editor's Note:

All conclusions are based upon information taken from the Marine Board of Investigation Report "Investigation into the circumstances surrounding the sinking of the uninspected fishing vessel *Arctic Rose*, official number 931446, in the Bering Sea on April 2, 2001, with one person deceased and fourteen persons missing and presumed dead," signed Dec. 19, 2003.

Acknowledgments:

Proceedings gratefully acknowledges the support of CAPT David Fish, LCDR Charles Barbee, LT Stephen Thompson, and Mr. Ken Olsen of the U.S. Coast Guard Office of Investigations and Casualty Analysis. We also appreciate the efforts of the investigators, the Marine Board of Investigations, the U.S. Coast Guard Marine Safety Center, and the Society of Naval Architects and Marine Engineers.

About the author:

Ms. Krista Reddington most recently worked as a technical writer in the Office of Standards and Evaluation at U.S. Coast Guard headquarters. Before writing for the Coast Guard, she was a government affairs associate for American Waterways Operators, and she has also worked for Xantic, an international satellite telecommunications company.

Endnote:

[1] The free-surface "sloshing" effect occurs when a tank is partially filled with liquid, and the movement of the liquid (in conjunction with the ship's rolls and pitches) slows the ship's return to vertical. This changes the center of mass and center of movement, and decreases stability. In heavy weather, this can increase the degree to which the ship rolls, and—in extreme cases—cause it to capsize.

Lessons Learned from Casualty Investigations

Communication Breakdown

Failed assumptions lead to a fatal sinking at sea.

by Ms. Krista Reddington
Technical Writer

Early in the morning of January 18, 2006, the uninspected tug *Valour* sank into the chilly, wind-blown sea off the coast of Wilmington, N.C. Late in the evening of the previous day, the vessel had been towing a barge that was fully loaded with heavy fuel oil when the master sounded the general alarm, alerting the crew to a significant port list.

The tug eventually sank in the stormy waters and three crewmembers lost their lives. Several factors contributed to the sinking of the vessel; unfortunately, almost all can be attributed to human error and the crew's lack of knowledge.

The Voyage Begins

Prior to the vessel's departure from Delaware, all slops and dirty oil were properly discharged and the potable water, wash water, and fuel tanks were topped off. The assistant engineer confirmed that no ballast was on board. In anticipation of heavy weather on the voyage to Texas, the captain reconfigured the tug and barge to accommodate a stern-towing operation with approximately 1,500 feet of 2.25-inch steel towing cable between the tug and tow.

Early in the afternoon of January 17, 2006, the chief mate noticed the vessel was listing slightly to port and ordered the assistant engineer on watch to pump 15 minutes' worth of ballast into the #18 starboard ballast tank. The approximately 3,750 gallons of water that were pumped into the ballast tank seemed to correct the list.

Nearly five hours later, the captain took over the watch and ordered the chief engineer, who was the engineer on watch, to pump the #18 starboard ballast tank dry. Shortly after this, an ordinary seaman went to the engine room to assist the chief engineer in correcting a leak in the port tail shaft and, upon completion of this task, went to bed. The ordinary seaman noticed the vessel was now listing slightly to starboard, a condition consistent with the vessel's natural list.

During this time the weather had began to deteriorate and the captain slowed the tug from seven knots to five knots. The wind was blowing at 40-60 knots, with gusts up to 70 knots and swells at approximately 10 feet. Under these conditions, the second mate, who was supposed to relieve the captain of his watch, was not comfortable being alone in the wheelhouse despite his extensive sea time and holding a master's license for over two years.

So the captain remained in the wheelhouse, lying down on the settee on the starboard side of the helm. At 10:30 p.m., only a half-hour later, the chief mate entered the wheelhouse to inform the captain of the slight starboard list that was consistent with the vessel's stability letter; the wind and waves pushing the tug and barge due north may have increased this natural list.

Miscommunication

The captain contacted the chief engineer to confirm that the #18 starboard ballast tank was empty. Upon confirmation, he ordered the chief engineer to pump 15 minutes' worth of ballast into the #18 port ballast tank. As the second mate was unaware of the stability letter requirements for the tug and had never given ballast orders prior to this voyage, it was understood that the captain would be responsible for all ballast operations during the second mate's watch.

However, this transfer of ballast operation responsibility was not conveyed to the chief engineer, who contacted the second mate shortly before 11:00 p.m. to see if the vessel was still listing to starboard. The chief engineer informed the second mate that he had been pumping ballast into the #18 port ballast tank for approximately 45 minutes despite having been ordered to pump only for 15 minutes. The second mate informed the chief engineer that the tug was not yet level. The pumping continued with no further communication between the wheelhouse and engine room, or within the wheelhouse itself. The captain was not made aware that the pumping continued beyond the specifications of his orders.

During the investigation, the captain stated that the chief engineer had corrected a list using the ballast system without permission from the mate on watch during a previous voyage; that chief engineer told the captain of his actions after they had been completed. At that time, the captain told the chief engineer that his actions were acceptable and, though not normal protocol, the company lacked a policy for ballasting this type of vessel.

Over-ballasting?

Between 11:00 and 11:15 p.m., the second mate and captain noticed the tug had first begun to level, then list to port, then roll to port. The captain contacted the chief engineer to determine what actions were being taken at the time and ordered him to pump out all ballast.

The captain took the watch and ordered the second mate to the engine room to assess the situation. The vessel continued its roll to port. During this time, the second mate failed to inform the captain of the conversations he had with the chief engineer regarding the continued pumping of ballast.

The captain sounded the general alarm at 11:20 p.m., slowed the vessel to three knots, and transferred the helm from autopilot to manual steering. The crew was informed via the public announcement system that there was an emergency in the engine room and to assist the chief engineer as necessary. He also ordered them to get their survival suits and life jackets.

At this point, the vessel was listing approximately 15 degrees to port in the increasingly rough waters. The crew was hastening to follow the captain's orders: the second mate was on his way to the engine room when the alarm sounded and stopped by his stateroom to grab his radio and place his survival suit in the passageway. He had passed an able-bodied seaman in the galley and told him to get his life jacket. The assistant engineer reported to the engine room and shut all watertight closures as ordered by the chief engineer. Two able-bodied seamen reported to the galley. The chief mate reported to the wheelhouse.

Upon entering the engine room, the second mate saw the chief engineer standing between the main engines giving him the "OK" sign. The second mate returned to the wheelhouse and reported this to the captain. He again failed to inform the captain of his conversation with the chief engineer regarding the pumping of additional ballast.

Miscommunication Leads to Mistrust

As the captain would later testify, he was unconvinced by the information he was receiving from the chief engineer, and, as a result, sent the second mate back to the engine room. At about this time, the ordinary seaman awoke and reported to the engine room where the chief engineer ordered him to help the assistant engineer.

The second mate arrived in the engine room to find the chief engineer standing between the two main engines and pointing to the port main engine. Due to the engine noise, the second mate was unable to hear what the chief engineer was saying. He looked where the chief engineer was pointing and saw oily water below the engine shaft level. The second mate left the engine room followed by the ordinary seaman, who had finished helping the assistant engineer and made sure he could be of no further assistance.

Improper Cross-Connections

As the second mate entered the galley from the engine room, he contacted the captain via hand-held radio to inform him there was water in the bilges, but the chief engineer felt he had the situation under control.

At 11:30 p.m., the captain radioed the tug *Independence*, which was approximately 30 miles away, to report they had taken on water but the engineer was working on it. Coast Guard Sector North Carolina overheard the conversation, immediately contacted the *Valour*, and was told that things were under control.

Back in the engine room, the chief engineer asked the assistant engineer to confirm that the #17 port and starboard fuel tanks were not cross-connected while he checked the same for the #4 port and starboard fuel tanks. The assistant engineer verified that and also noticed that a normal amount of water was in the area of the aft stern tube sump.

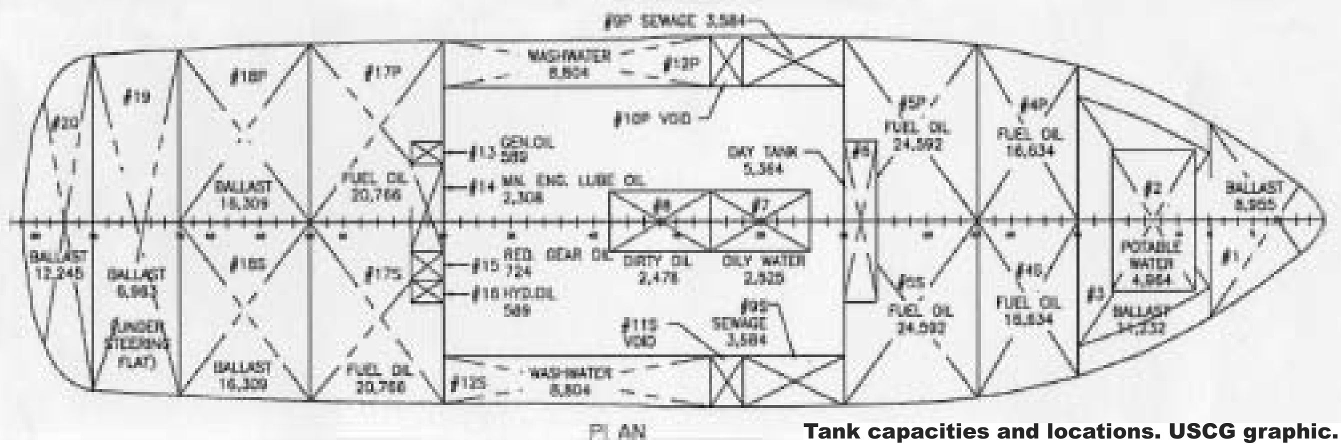
As was standard practice, the assistant engineer assumed that the cross-connects between the #5 port and starboard fuel tanks were open, as these tanks were currently feeding the day tank. Dives conducted during the week of September 10, 2007 revealed that the #4 as well as #5 port and starboard fuel tanks were cross-connected. There is no evidence that would indicate when the #4 fuel tanks were cross-connected and it could have occurred at any time during or before the tug's final voyage. The fuel valves on the tanks are "reach rods" and must be manually manipulated to determine their status, leaving no way to visually confirm whether the valves were open or closed.

During this time, an able-bodied seaman and the ordinary seaman had been working on securing a refrigerator when they realized that something was very wrong: The tug had rolled 25 degrees to port.

Man Overboard!

Two able-bodied seamen proceeded to the stack deck to assist with the chief mate. They were followed by an able-bodied seaman and the ordinary seaman who arrived to see the two able-bodied seamen looking for a way to help the chief mate up to the emergency deck. They had to rule out the possibility of using the port watertight door, as the severe list and roll to port would make it unsafe for the crew.

Moments later, one able-bodied seaman fell overboard from the ladder leading to the stack deck. Another able-bodied seaman yelled "man overboard," prompting the captain to notify the Coast Guard of a situation that was becoming increasingly perilous.



Tank capacities and locations. USCG graphic.

A Tragic Foreshadow

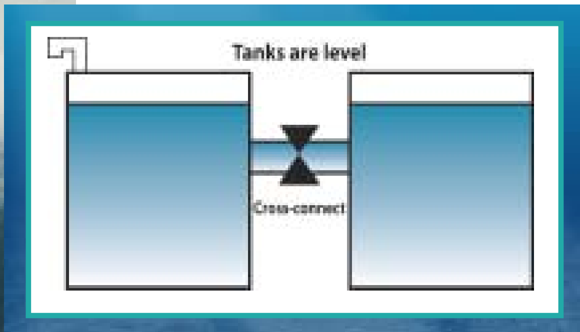
As the captain sent a "mayday" transmission to the Coast Guard, the chief mate went below to retrieve his survival gear. On his way, he fell down the ladder from the wheel house to the stack deck passageway. The captain heard a noise below deck and rushed from the wheel to investigate. He found the chief mate lying on the deck where he had landed.

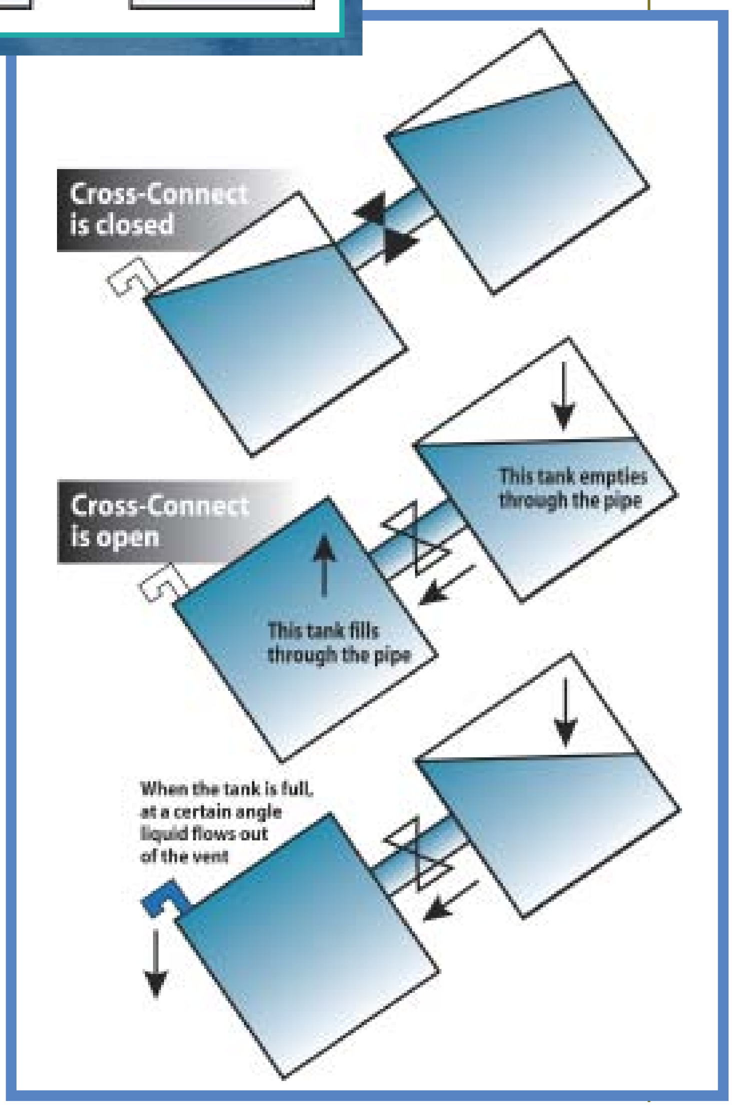
The second mate immediately went to assist the chief mate while the captain returned to the wheelhouse to radio the crew to inform them of the accident. He then notified the Coast Guard that the tug had an injured crewmember and may require a helicopter. The second mate found the chief mate dazed, with his legs awkwardly folded and apparently broken; he was clutching his chest and said he could not feel his legs and was having trouble breathing.

The captain sent an able-bodied seaman to the emergency locker for marker lights; however, the able-bodied seaman thought the captain had been referring to signal flares. When he could not find any, he proceeded down to the stack deck to assist the second mate with the chief mate, but did not notify the captain that he had not found the lights or that he had gone below decks.

The ordinary seaman went to the wheelhouse, where the captain ordered him to watch the green light attached to the lifejacket of the able-bodied seaman who had fallen overboard. The ordinary seaman continued to watch the position, keeping the captain informed of the able-bodied seaman's location for the next hour and fifteen minutes, as there were no waterlights, ring-buoys, or other indicators to mark the location.

The tug *Independence* was able to relay the mayday message of the floundering vessel to the parent company via the company's emergency number. The captain of the *Valour* did not make the company-required call, claiming he had experienced very unreliable cell phone coverage when he used the emergency number on a previous occasion. At the time, he didn't feel that it was safe to turn his attention away from the situation on his vessel and knew the *Independence* would convey the information to the company.





A Desperate Attempt to Regain Control

By this time, the chief mate had stopped breathing and the second mate began CPR. The captain informed the Coast Guard that the chief mate was possibly having a heart attack and seemed to have two broken legs.

As the vessel was now rolling 20 to 30 degrees to port, the captain told the Coast Guard he had his hands full trying to keep the vessel afloat. He stated he had lost the gyro and believed he was steering 103 degrees. During later testimony he amended that by stating that it was not the gyro that had failed, rather the display for the gyro, which had been blinking 103 instead of displaying a steady number. He also stated that, despite having a man overboard, he did not change his course and kept the vessel headed into the wind.

The chief engineer had been pumping water out of the #18 port ballast tank for approximately 20 minutes. He decided to stop discharging and start pumping ballast into the #18 starboard ballast tank. The captain agreed to this course of action. As the vessel was listing 35 degrees to port, the ballast pump sea suction would have been above the waterline and therefore incapable of supplying water to the ballast pump. The second engineer assisted in realigning the ballast system and then went to his stateroom to retrieve life jackets for himself and the chief engineer. He was unable to get the chief engineer's survival suit because his stateroom was blocked.

A Call for Help

Minutes before midnight, the captain ordered an able-bodied seaman to get the tug's Emergency Position Indicating Radio Beacon (EPIRB). As he moved to follow that order, the able-bodied seaman noticed the barge was now just off the port quarter of the vessel, but did not notify the captain of this development.

The captain asked the second mate to report to the wheelhouse and locate the position of the barge. The second mate stopped performing CPR on the chief mate, put an aspirin into the fallen man's mouth, and went to the wheelhouse, where both the captain and the second mate saw the barge on the port quarter of the vessel and worried that it might trip the tug.

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The Coast Guard Pieces Together the Puzzle

A Coast Guard investigation commenced and multiple dives were made to identify the cause of the accident. While the vessel was not salvageable, details were recovered through witness and crewmember testimony, video footage of the vessel sinking, dive observations, and video analysis.

The investigation revealed the crew of the tug had significant experience and the casualty had been avoidable. However, as the situation progressed, beginning with the chief mate having fallen down the ladder and the second mate attending him, as an able-bodied seaman fell overboard, the availability of uninjured, more experienced crew decreased with each loss. The constant change in crew dynamics may have kept the captain in an increased state of stress and distraction.

The Captain's Fatigue and Crew Management Style

Extended time in the wheelhouse could have been another contributing factor to the captain's fatigue, as he had just completed his watch. This could have added to the breakdown in communications between the wheelhouse and engine room as the situation developed. His fatigue and the circumstances taking place aboard his vessel may likely have been the primary factors in the captain's blurred judgment as the situation progressed.

Known to be an easygoing person, the captain treated his crew like friends and family. As a result, the bridge resource management broke down and enabled unnecessary and therefore dangerous ballast transfers to be conducted with little or no oversight.

It was stated that the chief engineer had carried out ballast operations without direction from the captain or the wheelhouse on a previous occasion. While the captain acknowledged that it was not normal protocol, there was no company policy prohibiting this. This established the chief engineer's motivation in continuing to pump ballast after the 15 minutes ordered by the captain and deemed it acceptable in his eyes.

Communication Problems

Although the chief engineer was conducting ballasting operations without communication with the wheelhouse, additional ballasting operations were ordered by the captain. The chief engineer was not informed of this and continued to report to the second mate, who then failed to report the procedures to the captain. The failure of the second mate to report to the captain was partially responsible for the breakdown in the captain's situational awareness of the vessel's stability and resulted in the eventual overfilling of the #18 port ballast tank.

Another fatal lack of communication occurred when the able-bodied seaman misunderstood the captain's direction to throw signal flares into the water for the man overboard. When the able-bodied seaman could not locate the marker lights he thought the captain wanted, he found it acceptable to continue to another task instead of reporting back to the captain.

Failure to Practice Good Seamanship

The investigation found several instances where the captain failed to make timely decisions that could have saved the lives of his crewmembers. The barge was not released until it threatened to overtake the tug. Releasing the tow earlier would have enabled tug maneuverability, which may have allowed them a better chance to locate the able-bodied seaman who had fallen overboard.

The captain testified he did not release the barge earlier, as he was trying to prevent an environmental disaster that could have resulted from the fully loaded barge floating free of its tow.

Twice the crew had the opportunity to get off the sinking vessel; once, when the captain maneuvered the tug close to the life raft dropped by the Coast Guard helicopter, and then again when the crew mustered on the bow with the *Justine Foss* waiting to pull them from the water. The captain stated that in both instances, he had discussed the option with an able-bodied seaman and the chief engineer, but neither felt they could physically make the jump. None of the other crewmembers recalled hearing any conversation involving the life raft.

Failure to Follow Regulations

Although the captain possessed appropriate knowledge of marine operations, his knowledge of the tug's specifics was deficient. The tug's stability letter, issued by the American Bureau of Shipping in 1998, stated that the master of the vessel was responsible for maintaining stability in accordance with the stability letter.

Though stability letters are addressed to vessel masters, licensed engineers are responsible for ensuring that other deck officers are aware of any violations of the stability letter that may occur in the engine room. The assistant engineer stated that it was standard practice within the company to leave the cross-connect valves open on the pair of fuel tanks that feed the day tanks, even though he was aware of the stability letter requirements and knew that he and the chief engineer were violating those requirements.

While the vessel was able to operate in exposed waters, it was necessary that certain restrictions be observed, one of which was that cross connections between the port and starboard tank pairs must be kept closed at all times while underway. Another restriction stated that every effort should be made to determine the cause of a list prior to taking any corrective action.

Conclusions

In interviews following the casualty, masters of two other tugs owned by the same company that operated *Valour* stated they did not conduct or allow ballasting operations to correct minor lists. In accordance with their stability letters, the other masters also did not allow anyone other than themselves to authorize ballast operations.

Additionally, a grave mistake was made in allowing the engineers to stop pumping ballast water out of the #18 port ballast tank and start pumping into the #18 starboard ballast tank. The vessel was listing to port and sinking by the stern; introducing more weight aft of the engine room reduced the tug's reserve buoyancy. At the angle the tug was listing, the ballast pump sea suction was not submerged, and therefore was pumping only a minimal amount of water into the #18 starboard ballast tank, which assured that the vessel would not right itself.

Further, the #4 and #5 port and starboard fuel tanks were cross-connected. If they had not been, and so the washwater tanks also would have been unconnected, it would have allowed for hydrostatic balancing, making it possible that this casualty may not have occurred.

Realizing the gravity of the situation, the captain ordered the second mate to release the barge, despite the second mate's lack of familiarity with the procedures necessary to accomplish the release. Arriving on the aft main deck, the second mate found the entire port gunwale and stern of the tug underwater and a couple feet of water on the deck. The barge was abeam to port of the tug and the towline roller was as far to the port side of the tow bar as possible.

Worried about the risk of falling overboard while trying to release the barge, the second mate, now with an able-bodied seaman's guidance, released the air brake and the winch hand brake. His actions allowed the towline to pay out, but the end of the wire caught on a connecting U-bolt and failed to release. The second mate notified the captain of these events and returned to the assistance of the chief mate.

The First Rescuers Arrive

The assistant engineer had been in the engine room as the events of the night were playing out and, though he knew that the vessel was listing severely, he had not been informed of the other incidents involving downed crewmembers. When the captain called him to the wheelhouse to assist with releasing the tow, he stopped to get his survival suit from his stateroom.

As he passed the stack deck, he found the chief mate lying at the foot of the ladder with no pulse and, as he arrived in the wheelhouse, he was informed that an able-bodied seaman had fallen overboard. Sent to complete the task, the assistant engineer successfully released the barge after jiggling the towing winch. The end of the line broke free and the barge was released just after midnight. The Coast Guard was informed of this just as they had been advised, minutes earlier, that the vessel was continuing to pump ballast to the starboard side and the vessel was still afloat. The crew had not yet retrieved the man overboard, though they thought they were looking in the right area and were attempting to get to him.

After the barge was released, the assistant engineer, an able-bodied seaman, and the ordinary seaman gathered ringbuoys in the event they did find the able-bodied seaman overboard. The captain was able to maneuver the vessel toward the man, the crew threw the ringbuoys to him, and he was able to grab one. They used several tactics to pull him back aboard the vessel, but all attempts failed.

Coast Guard Helicopter 6553 arrived. While hoisting the able-bodied seaman from the water, the crew notified Sector North Carolina that the tug was sinking quickly. The helicopter crew determined they did not have enough fuel to rescue the rest of the tug crew and dropped a 20-person life raft prior to departing the scene.

The weather made it impossible for the men aboard the sinking vessel to reach the inflated life raft where it had been dropped, but the captain was able to maneuver the sinking tug so that the raft was touching the port side for a brief time. The captain gave his crew the option to stay on the tug or make for the life raft. He later testified that the crew opted to remain aboard the tug.

The Captain's Decision

The vessel was heeled over and rolling hard to port; the aft main deck was completely awash. The crew was ordered to muster on the bow and put on their life jackets or survival suits, and the captain waited for everyone to arrive on the bow before leaving the wheelhouse.

The second mate had been ordered to cease CPR on the unresponsive chief mate; he then retrieved the EPIRB and placed it inside his survival suit before joining the others on the bow. Only four crewmembers wore survival suits. The assistant engineer and chief engineer were unable to find suits that fit—the assistant engineer had grabbed a suit that was too small and was unable to access another suit that would fit him, and there were no survival suits aboard that were big enough to fit the chief engineer.

The tug *Justine Foss*, having answered the Coast Guard's call for assistance, arrived on the scene just after 1:00 a.m. and waited for the crew to abandon the ill-fated tug. Nearly an hour later, the rescue vessel reported seeing the crew of the other tug mustered on the bow for more than 20 minutes, but the captain never gave the order to abandon ship. During later testimony, the captain claimed he did not give the order because he did not believe the vessel would sink.

Washed Overboard

Several crewmembers were standing at the forward-most part of the bow when the tug, severely trimmed by the stern, pitched with the bow straight up. One able-bodied seaman was thrown into the water, while another able-bodied seaman and the chief engineer fell from the bow, landing on the superstructure before entering the water.

A large wave washed the second mate into the water as the ordinary seaman remained on top of the bow fenders where he tried to pull the assistant engineer up as the captain pushed him from below. The crew of the *Justine Foss* was able to locate the able-bodied seaman who had fallen into the water. Several failed attempts were made to rescue him, but after he was seen face-down, the crew decided to devote their energy to crewmembers who they knew to still be alive, including the second mate.

The captain, assistant engineer, and ordinary seaman were on the fender of the tug when a large wave washed them into the sea. They remained together, with the two men assisting the assistant engineer (who was not a strong swimmer) in staying afloat for about 20 minutes, until the crew of the other tug was able to pull them aboard.

The crew of the *Justine Foss* was able to rescue the able-bodied seaman who had been washed overboard as the tug sank, as well as the chief engineer who they found alive, but with a broken arm and leg. Shortly after the crew had the chief engineer aboard he stopped breathing and went into cardiac arrest. The crew did their best to revive him using CPR and the vessel's automatic external defibrillator, but the man died aboard of what the medical examiner later proclaimed hypothermia and exposure. He had been in the water for more than 45 minutes.

As the rescue tug continued to search for the able-bodied seaman who remained in the water, a Marine Corps helicopter lowered three Coast Guard personnel onto the barge so they could secure a tow line to ready it for the *Justine Foss*. The crew of the tug was able to connect the tow line and take the barge back to Wilmington, N.C.; the Coast Guard personnel were hoisted from the barge and taken to Fort Macon.

The Aftermath

Following its investigation (see sidebar), the Coast Guard recommended disciplinary action against the captain of the tug. As a result, a suspension and revocation action was initiated against his license for negligence, misconduct, and a violation of law or regulation.

Additionally, the Coast Guard recommended a review against the second mate for negligence and possible incompetence as well as a review against the assistant engineer for misconduct.

Sadly, the fate that befell the tug, including the deaths of three crewmembers, may have been prevented with proper knowledge of the vessel's requirements and better communication.

Editor's Note:

All conclusions are based upon information taken from the U.S. Coast Guard Report of Investigation "Investigation into the circumstances surrounding the sinking of the tug *Valour* 40 miles off the coast of Wilmington, North Carolina on January 18, 2006 with multiple loss of life," dated Mar. 27, 2008.

Acknowledgments:

Proceedings gratefully acknowledges the support of CAPT David Fish, LCDR Charles Barbee, LT Stephen Thompson, and Mr. Ken Olsen, U.S. Coast Guard Office of Investigations and Casualty Analysis.

About the author:

Ms. Krista Reddington most recently worked as a technical writer in the Office of Standards and Evaluation at U.S. Coast Guard headquarters. Before writing for the Coast Guard, she was a government affairs associate for the American Waterways Operators, and she also worked for Xantic, an international satellite telecommunications company.

Many people who came to the rescue of the *Valour* as the tug and crew foundered in the stormy seas off the coast of North Carolina were honored for their heroic efforts.

Two members of the Coast Guard helicopter crew who flew to the scene and pulled the able-bodied seaman to safety received the Coast Guard Commendation medal, awarded to them by the Commander of the Seventh Coast Guard District.[1]

The crew of the *Justine Foss* received the Lifesaving Award at the Seaman's Church Institute's Silver Bell Dinner. The crew was honored for its rescue of the six crewmembers, as well as for retrieving the barge that had been released from the sinking vessel.[2]

Endnotes:

1. Coast Guard News, February 26, 2007.
2. Foss Maritime, Tow Bitts, July 2006.

Nautical Engineering Queries

Questions

Prepared by NMC Engineering Examination Team

1. A fuel oil settler is 35 feet 4 inches (10.7696 m) long, 25 feet 10 inches (7.8740 m) wide, and 19 feet (5.7912 m) deep. The noon sounding indicated a level of 15 feet 2 inches (4.6228 m). The fuel oil meter read 6517 (24669) at that time and 8911 (33732) at 1600. How many barrels / cubic meters of fuel oil remained in the settler at 1600?

A. 127,338.99 bbls (20245.24 cubic meters)
B. 101,164.79 bbls (16083.87 cubic meters)
C. 3,031.99 bbls (482.05 cubic meters)
D. 2,408.35 bbls (382.95 cubic meters)

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2. In a squirrel cage-type induction motor, the primary rotating magnetic field is established by the __________.

A. current induced in the rotor windings
B. application of a three-phase voltage supply to the stator windings
C. laminated steel core and aluminum conductors in the rotor
D. interaction of the magnetic field caused by the induced current in the squirrel cage bars with the magnetic field of the stator

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3. The mutual action between parts of a material to preserve their relative positions when external loads are applied to the material which tends to resist deformation when subjected to external forces is known as __________.

A. stress
B. strain
C. shear strength
D. ultimate tensile strength

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4. In accordance with Coast Guard regulations (46 CFR), the maximum allowable working pressure of a water tube boiler must be stamped on the __________.

A. burner front
B. lower header
C. name plate
D. drum head

PROCEEDINGS Summer 2010

1. **While assigned to a 90 GRT vessel, you are required to sign "foreign" articles on a voyage from Philadelphia to which port?**

   A. San Francisco, Calif.
   B. Baltimore, Md.
   C. Tampico, Mexico
   D. Montreal, Canada

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2. **Which statement is true concerning the testing of the line-throwing appliance?**

   A. It shall be fired at least once in every three months.
   B. A drill in its use shall be held once in every three months.
   C. Drills shall be held quarterly and it shall be fired annually.
   D. No drills are required.

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3. **If a weather bulletin shows the center of a low-pressure system to be 100 miles due east of you, what winds can you expect in the Southern Hemisphere?**

   A. south-southwesterly
   B. north-northwesterly
   C. south-southeasterly
   D. north-northeasterly

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4. **Both International and Inland: The masthead light may be located at other than the fore and aft centerline on a vessel __________.**

   A. less than 50 meters in length
   B. less than 20 meters in length
   C. of special construction
   D. engaged in trolling

1. A. 127,338.99 bbls (20245.24 cubic meters) — Incorrect Answer. Choice "D" is the only correct answer.
   B. 101,164.79 bbls (16083.87 cubic meters) — Incorrect Answer. Choice "D" is the only correct answer.
   C. 3,031.99 bbls (482.05 cubic meters) — Incorrect Answer. Choice "D" is the only correct answer.
   D. 2,408.35 bbls (382.95 cubic meters) — Correct Answer. *Solution as follows:*

L x W x H = 35′04″ x 25′10″ x 15′02″ = 35.333 ft x 25.833 ft x 15.166 ft = 13842.878 ft^3
1 cubic foot = 7.48 gallons
Thus: 13842.878 ft^3 x 7.48 gal/ft^3 = 103544.72 gals
1 Barrel = 42 gallons
Thus: 103544.72 gals ÷ 42 gals/bbl = 2465.35 bbl of fuel oil (FO) in settler @ noon
Fuel Oil Meter @ Noon = 6517 gals
Fuel Oil Meter @ 1600 = 8911 gals
FO consumption = 8911 – 6517 = 2394 gals = 57 bbl
FO in settler @ 1600 = 2465.35 – 57 = 2408.35 bbl

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2. A. current induced in the rotor windings — Incorrect Answer. The current induced in the rotor windings (bars) is established by the primary rotating magnetic field.
   B. application of a three-phase voltage conductors in the rotor — Correct Answer. The stationary member, or stator, of a squirrel cage-type induction motor consists of three overlapping windings. The windings are spaced and connected in a manner that causes the development of the primary rotating magnetic field when connected to a three-phase voltage supply.
   C. laminated steel core and aluminum supply to the stator windings — Incorrect Answer. See explanation for Choice "A." The rotating member, or rotor, consists of a slotted laminated steel core in which molten aluminum is cast to form a "one-piece" cage consisting of the rotor conductors, end rings, and fan blades. The current induced in the rotor is contained within the circuit formed by the aluminum conductors and end rings.
   D. interaction of the magnetic field caused by the induced current in the squirrel cage bars with the magnetic field of the stator — Incorrect Answer. The interaction of the secondary magnetic field of the rotor with the primary magnetic field of the stator results in a mechanical force on the rotor bars that is in the same direction as the rotating field of the stator. The result is rotor rotation in the same direction as the mechanical force.

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3. A. stress — Correct Answer. Stress is the internal resistance, or counterforce, of a material to the distorting effects of an external force or load. *Expressed mathematically:* $\sigma = F/A$
   where:
   σ = stress (psi or kg/cm^2)
   F = applied force (lbs or kg)
   A = cross-sectional area (in^2 or cm^2)
   B. strain — Incorrect Answer. Strain is the change in length of an object under applied force(s).
   C. shear strength — Incorrect Answer. Shear strength is the maximum *shear stress* a material can withstand without rupture. Shear stress, or tangential stress, is the stress in which the material on one side of a surface pushes on the material on the other side of the surface with a force that is parallel to the surface.
   D. ultimate tensile strength — Incorrect Answer. Ultimate tensile strength is the maximum stress a material subjected to a load can withstand without tearing. Dividing the load at failure by the original cross-sectional area determines the value.

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4. A. burner front — Incorrect Answer. Choice "D" is the only correct answer.
   B. lower header — Incorrect Answer. Choice "D" is the only correct answer.
   C. name plate — Incorrect Answer. Choice "D" is the only correct answer.
   D. drum head — Correct Answer.
   46 CFR 52.01-140 (b)(1) states: "Upon satisfactory completion of the tests and Coast Guard inspections, boilers must be stamped with the following: (iv) Maximum allowable working pressure ___ at ___ °C (°F):"
   46 CFR 52.01-140 (b)(2) states: "The information required in paragraph (b)(1) of this section must be located on: (ii) The drum head of water tube boilers."

1. A. San Francisco, Calif. — Correct answer. As per 46 CFR 14.201, articles of agreement are required for vessels of 75 gross tons or more on a voyage between a port of the United States on the Atlantic Ocean and a port of the United States on the Pacific Coast.

B. Baltimore, Md. — Incorrect answer.

C. Tampico, Mexico — Incorrect answer.

D. Montreal, Canada — Incorrect answer.

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2. A. It shall be fired at least once in every three months. — Incorrect answer.

B. A drill in its use shall be held once in every three months. — Correct answer. As per 46 CFR 199.180 (e) Line-throwing appliance, a drill must be conducted on the use of the line-throwing appliance at least once every three months. The actual firing of the appliance is at the discretion of the master.

C. Drills shall be held quarterly and it shall be fired annually. — Incorrect answer.

D. No drills are required. — Incorrect answer.

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3. A. south-southwesterly — Correct answer. In the Southern Hemisphere, winds around a center of low pressure rotate in a clockwise direction. If a system is due east of your position, you would experience winds coming from a south-southwesterly direction.

B. north-northwesterly — Incorrect answer.

C south-southeasterly — Incorrect answer.

D. north-northeasterly — Incorrect answer.

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4. *Note: International & (Inland) Rule 1(e) paraphrased states: "Whenever the Government (Secretary) concerned (determines) shall have determined that a vessel (that a vessel or class of vessels) of special construction or purpose cannot comply fully with the provisions of any of these Rules with respect to the number, position, range, or arc of visibility of lights or shapes … such vessel (the vessel) shall comply with such other provisions in regard to the number, position, range, or arc of visibility of lights or shapes … as her Government shall (as the Secretary shall) have determined to be the closest possible compliance with these Rules in respect to that vessel."*

A. less than 50 meters in length — Incorrect answer.

B. less than 20 meters in length — Incorrect answer.

C. of special construction — Correct answer. A relocation of a masthead light applies only to a vessel or class of vessels of special construction or purpose.

D. engaged in trolling — Incorrect answer.

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