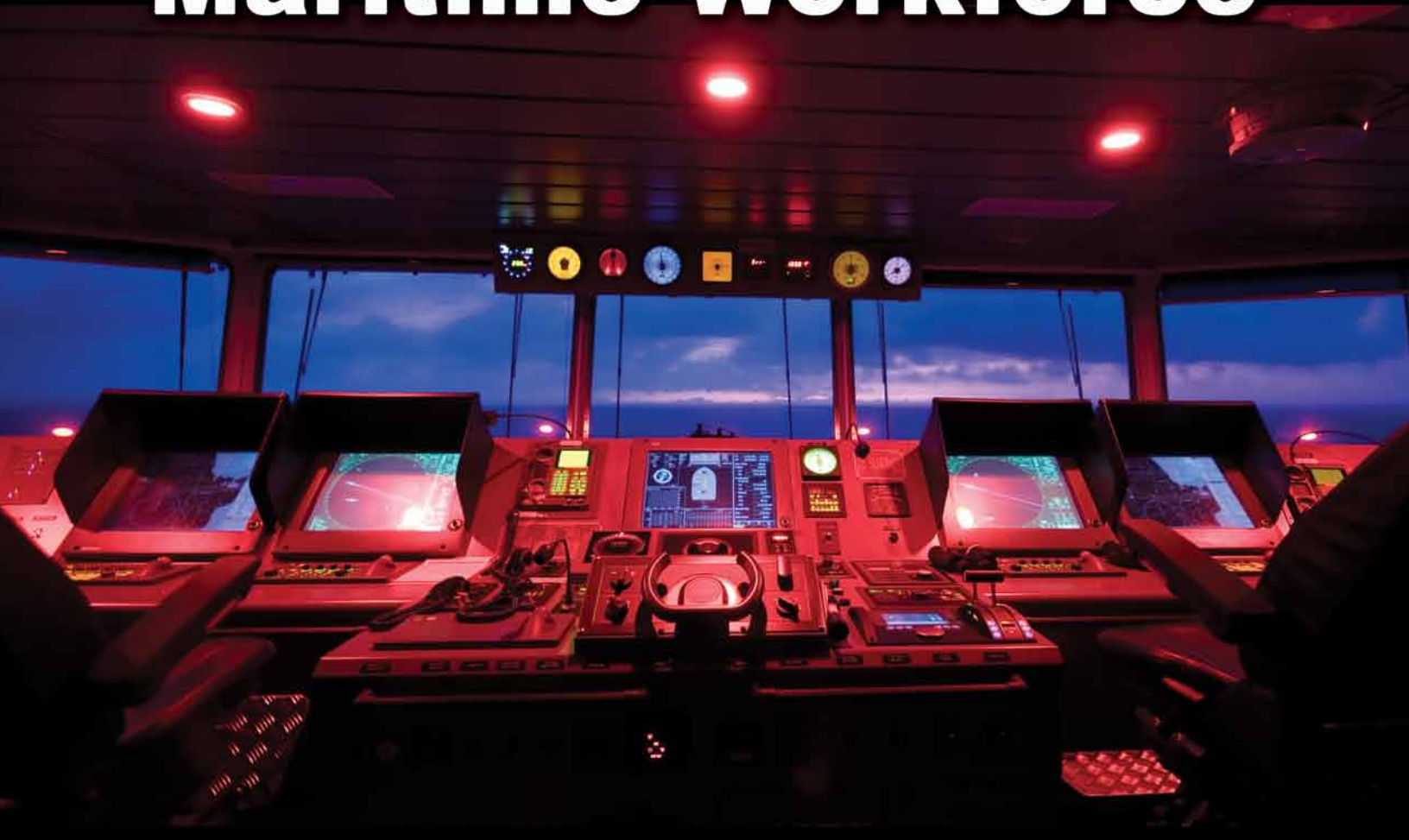


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January–April 2017

The 21st Century Maritime Workforce



*Recruiting and training
the next generation*



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Assistant Commandant's Perspective

by REAR ADMIRAL PAUL F. THOMAS
Assistant Commandant for Prevention Policy
U.S. Coast Guard

I am pleased to present this edition of *Proceedings*. This issue provides insightful articles that add to the dialogue about the incredible importance of the maritime workforce in an ever-changing and increasingly complex maritime environment.

Marine transportation is critical to the U.S. supply chain. The marine transportation system (MTS) provides the means to move raw materials to factories, gets goods to market, and transports energy from areas of production to areas of consumption. Waterborne cargo shipped within the MTS carries 74 percent by weight, and 47 percent by value, of all U.S. trade. In a world where manufacturing is mostly overseas, the maritime workforce in our country's supply chain is more important than ever.

Since the late 18th century, seaborne transportation and merchant mariners have greatly contributed to our nation's prosperity. Dating back to 1790, history forever linked the mission of the U.S. Coast Guard with the U.S. merchant marine—one, the protector of the high seas, and the other, the transporter of goods and services, including troops during wartime. In February 1942, President Franklin D. Roosevelt granted the Commandant of the Coast Guard the authority to issue credentials to merchant mariners under the First War Powers Act of 1941.

During World War II, the function of marine safety transferred to the Coast Guard in part because of the wartime threats to commercial ships that led to one in 26 mariners perishing in the line of duty. The service, in turn, granted the officer in charge, marine inspection, the authority to issue licenses. After WWII, American influence helped create a world of free trade due to our sea power and merchant shipping.

In 2006, the Coast Guard centralized mariner credentialing at the National Maritime Center in Martinsburg, West Virginia. There, more than 212,000 active merchant mariners have been granted the authority to sail. Whether an oiler in the engine room, a mate manning the watch, or an able seaman on deck, the merchant mariner is the most critical part of a seagoing workforce and represents a vital component of national security.

Challenges facing today's maritime industry range from recruiting and retaining a qualified workforce to meeting increasing regulatory requirements and training in new technology. To support this approach, the Coast Guard must continue to implement policies and regulations for mariner training that leverage innovative technologies, minimize burdens to both mariners and training providers, and lead to safe operation of technologically advanced vessels in environmentally sensitive locations.

In an effort to help mitigate the challenges facing mariners and the MTS, the Coast Guard and the maritime industry are developing strategies to address a variety of issues, including increased mariner wellness, cyber risk management, utilizing evolving energy sources, and increased environmental protection. Merchant mariners, shipping companies, and government entities play a significant role in making these strategies a success.

The future success of a strong merchant marine workforce will only come through the collaboration of all maritime stakeholders. I look forward to your feedback on this issue of *Proceedings*. I am also eager to hear your thoughts on initiatives we can jointly tackle to ensure a robust, healthy, well-trained workforce that will lead to a safe, secure, and efficient marine transportation system.

Champion's Point of View



by Ms. MAYTE MEDINA
Chief, Office of Merchant Mariner Credentialing
U.S. Coast Guard

I was pleased and honored to champion this edition of *Proceedings*. It is well known that the U.S. marine transportation system is critical to the U.S. economy. It is therefore imperative that this country has enough mariners today and in the future for this vitally important industry. Not only do we need to meet capacity demands, we need to ensure that mariners are properly trained and qualified to discharge their duties and responsibilities.

The Coast Guard has the responsibility to develop the standards for mariner training and qualification—an obligation we take very seriously. We fully recognize that we cannot do this by ourselves. We need to rely on valuable input from the industry as we continue to develop standards for mariners to meet new challenges. We continue to leverage relationships with industry groups and employ our advisory committees, such as the Merchant Personnel Advisory Committee and the Merchant Mariner Medical Advisory Committee, to evaluate emerging and existing areas of concern within the maritime industry and to advise us on how best to ensure U.S. mariners will fit the bill.

Recent examples of issues include mariner fatigue mitigation, mariner medical standards, the safe operation of vessels utilizing alternative fuels, and operating in polar waters. The resultant domestic regulations and international standards help us to ensure that our mariners continue to be a highly trained workforce.

While extremely important, developing standards is really just the first step in the process. It often means that training institutions must create new—or amend existing—training courses and programs. Our maritime academies and course providers devote considerable effort to ensure compliance. Here again, we rely on our relationship with the industry to provide advice and insight to help us ensure we do not overly burden our training providers.

Finally, we need to make certain our mariners have received the requisite training and have attained the necessary skills and proficiency required to operate the ships of today and tomorrow. One recent area of emphasis we are working to exploit is transitioning military veterans to the civilian maritime service. For many years, the Coast Guard has devoted significant resources to assessing military training to determine whether it can fulfill commercial vessel mariner training requirements. This assessment was difficult, at times, due to inconsistencies in terminology and, in some cases, a lack of clear understanding of training that was actually conducted by the military service.

To help tackle these problems, the Coast Guard's mariner credentialing program has partnered with the industry as well as the Maritime Administration, U.S. Navy, U.S. Army, and the Coast Guard workforce training staff to develop the tools to make the evaluations of training easier for all parties.

You will find much more information on this work as well as the other issues mentioned in the articles in this issue. I'll close with a simple note of thanks to our maritime workforce. I recognize the impacts of new requirements on the mariners employed in this vital segment of the U.S. economy, and I recognize the sacrifices required to continue to be a part of the maritime industry. I continue to be impressed by the mariners I meet and their commitment to remain among the best trained in the world.

I personally thank you for your service, and hope that all enjoy this issue of *Proceedings* as much as I do.

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Mariners in the New Millennium

Maintaining a U.S.-flagged merchant marine.

by MR. RICHARD BERKOWITZ
*Director, Pacific Coast Operations
Transportation Institute*

Top government, military, and regulatory leaders have recently underscored that a domestic maritime workforce is vital to the nation's economic, environmental, and military strength, as well as to homeland security. History supports

“... we don't have a lift within the U.S. fleet to respond to a contingency at a point in time that we are seeing the re-emergence of pure competitors—it is in our nation's best interest to protect our maritime resiliency ...”
—Admiral Paul F. Zukunft
U.S. Coast Guard Commandant



TOTE Maritime's S/S *Westward Venture*, a Jones Act-compliant coastwise Roll-on/Roll-off vessel, navigates the Gulf Intracoastal Waterway near Corpus Christi, Texas, carrying military vehicles and armor to Kuwait under a Military Sealift Command charter during Operation Iraqi Freedom. Photo courtesy of TOTE Maritime.

this stance, as there have been documented cases of foreign-flagged vessels whose crew flinched at the thought of transporting military cargo into potentially hostile trade lanes and ports during Operation Desert Shield, and similar and broader problems occurred with foreign-flagged ships during the Vietnam War.¹ Military planners recognize we have allies we may not be able to rely on.

Consequently, assuring an adequate pool of trained, experienced, certificated, fit, and available licensed and unlicensed U.S. mariners is in the nation's interest. Unfortunately, the likelihood of this availability is far less certain than at any other time in our modern history.

“The mariners who move international trade and those who transport wartime cargo come from the same dwindling pool of U.S. mariners. If that U.S. mariner base gets too small, we will have to rely on other countries to deploy our combat power.”
—General Darren W. McDew
Commander, U.S. Transportation Command

A Tipping Point

Our nation's sailing presence in the global trade lanes has been reduced to its lowest level in American history, with only 78 U.S.-flagged commercial vessels. Among these vessels, 60 are enrolled participants in the Maritime Security Program (MSP) and receive up to \$3.5 million per year in federal stipends to diminish the difference in maintenance costs, payroll, regulatory hurdles, and taxes not required of their foreign competitors.² As a Maritime Security Program

participant, the vessel operator provides the U.S. government with immediate, guaranteed access to required vessel and intermodal system capacity.

However, these vessels' voluntary commitment to the Maritime Security Program remains uncertain, given that these ships are also reliant upon government-impelled cargoes that were once considered reliable, but which are now no longer readily available due to squabbling over the Export-Import Bank, reductions in foreign food aid cargoes sourced from U.S. suppliers, and a steady decline in the number of U.S. troops serving overseas.

A 2016 Hoover Institution paper on U.S. force posture revealed that the U.S. population serving on active duty is lower today than at any other time since the 1950s, and there are fewer deployed U.S. troops based overseas, relative to the world's population, than at any time since 1950.³



Response exercise in Drammen, Norway. Photo courtesy of the American Roll-on Roll-off Carriers.

“I consider cargo preference an investment in our national security, because if you put some cargo on the table, the U.S. flag will see an opportunity and they will acquire or build ... ships. They will flag them in the United States if there's some cargo there for them to haul.”

**—Rear Admiral Thomas Shannon
Commander, Military Sealift Command**

State of the Domestic Fleet and Workforce

The domestic cabotage, or Jones Act vessel fleet, has also shrunk.⁴ Although there are roughly 40,000 commercial vessels in the Jones Act fleet, the vast majority are workboats, passenger vessels, ferries, tugs, and barges. As of late 2016, the deep-draft Jones Act fleet was comprised of just 91 vessels that have potential military utility for surge and/or sustainment.⁵

Further, despite the resurgence in domestic shipyards building tank vessels to meet the unprecedented growth of domestic petroleum reserves, the domestic deep-draft trade has seen some foreboding trends. The rapid rise of offshore oil and gas development led many mariners to move from the inland, rivers, and deep-sea sector to seek employment

in the Gulf of Mexico to take advantage of skyrocketing wages. When oil prices fell in 2014, however, this proved to be another notch in the boom-and-bust cycle all too often reflected on the waterfront.

This decline notwithstanding, there remains a need—in some cases, dire—for certificated and capable mariners. For example, a 2015 joint Departments of Labor, Education, and Transportation report suggests that there will be 74,000 job openings (roughly split between licensed and unlicensed positions) available to new entrants to the maritime sector between 2012 and 2022.⁶



Commercial trailers are stowed aboard the TOTE Roll-on/Roll-off vessel M/V *Midnight Sun* at the Port of Anchorage, Alaska, for a return coastwise shuttle to the Port of Tacoma, Washington. Photo courtesy of the author.



A Liberty Maritime Roll-on/Roll-off vessel discharges a load of pipes as part of a March 2016 U.S.-flag-impelled government contract of the U.S. Army Corps of Engineers from Busan, Korea, to Beaumont, Texas, for a Midwest public dam project. Photo courtesy of Liberty Maritime, Inc.

Restrictions

Not all of these positions will require a credential. However, meeting the requirements of the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, 1978 (STCW), as amended, and its subsequent amendments requires mariners to obtain additional training. This adds to the costs (in time and money) a person must devote to obtain and retain a job in the maritime sector.

This challenge is not only driving experienced mariners to seek shoreside employment or retirement, but it also prompts those inclined to pursue a waterborne career to abandon the inclination. For example, one union source shared the approximate minimum costs (2016 figures) for a new, unlicensed mariner to obtain referral and find employment aboard a typical cargo vessel in the U.S. fleet:⁷

- Passport \$110
- TWIC 130
- Drug Test 60
- Physical Screening 240
- Functional Capacity Test 160
- Basic Safety Training 1,050
- Merchant Mariner Document 100
- Total \$1,850

Many industry observers maintain that the STCW requirements for formalized classroom training has become a death knell for the “hawsepiper” (a nautical metaphor referring to an officer who has progressed from being an unlicensed mariner without graduating from a maritime college or academy), as the simplicity of gaining sea-time experience, then passing the requisite U.S. Coast Guard license exam is

not readily possible. In response, a number of private, employer, and labor union maritime training schools have developed innovative apprenticeships, coursework, and simulation platforms, but these burdens and attendant voluntary exits from the industry are anticipated to rise once the 2017 STCW medical certificate, advance firefighting (licensed), and completion of other approved training and seagoing requirements come into full effect.

Available Resources

The federal and state maritime academies have been successful in attracting and graduating a diverse and qualified student body. However, industry observers have noticed a tendency for more recent academy graduates to curtail their sea-going careers, finding a position ashore sooner than other generations before. This makes alternative industry officer initiatives critical.

The U.S.-flagged sector should encourage the K–12 system to create and broaden their maritime curricula while offering students greater experiential learning opportunities. Getting the attention and interest of youth during their formative years is essential to the future of the industry. Despite some early success stories, at present, the industry will need to support these still-uncertain pathways for employment.

Moreover, the *Wall Street Journal* reported in 2014 on the problems the military had recruiting from the nation’s high schools, as more than two-thirds of high school-age students would not qualify for military service under current restrictions due to “physical, behavioral, or educational shortcomings...”⁸ Though not all of these deficiencies (being noticeably tattooed, for instance) would render such youth ineligible for a mariner workforce pool, felony convictions,



The Liberty Maritime Roll-on/Roll-off vessel M/V *Promise* loads commercial vehicles in Mumbai, India, for transport to Mexico. Photo courtesy of Liberty Maritime, Inc.

illicit drug use, certain legal prescriptions, minimal educational standards, and weight and mental health issues would still provide challenges to becoming eligible to proceed to a commercial maritime career.

Military to Mariner

As a consequence of the shortcomings in the potential work force, the millennial generation's limited familiarity with maritime employment or with family members with seafaring traditions, and growing financial and regulatory barriers to becoming a certificated rating crewmember or licensed officer, it makes abundant sense for the U.S. maritime industry to look ever more closely at pursuing members separating from the armed services as the most likely and reliable pool of talented men and women to serve on U.S.-flagged vessels. This is why vessel operators of all types and sizes, along with maritime labor unions, have embarked on what is commonly referred to as the "military to mariner" initiative.

Sea service members, in particular, and military service members in general have the talent, leadership, capabilities, attitude, and discipline to help meet the mariner shortage the industry and the nation faces. After all, military vets are more likely to understand the chain of command, have technical proficiencies, stay physically fit, be agile team members, be safety conscious, appreciate diversity, be mission-oriented, and tend to achieve in dynamic environments. They, as well as their families, are accustomed to separation, and know how to make do with unusual work schedules.

In recent years, the U.S.-flagged maritime industry has pursued legislation, coordination, engagement, outreach, and a revived commitment in this arena, and we are beginning to see solid achievements. With the help of military service leaders, steadfast encouragement from congressional members, nudging from the maritime administrator, and support of other policymakers, the transition of sea service

and military vets into the maritime sector will become more transparent, affordable, seamless, and achievable.

This is a winning objective for all involved, as the military will be able to attract and retain more quality candidates when these individuals know their performance, conduct, and training will serve them well upon separation into the private sector. Service members will be ready to quickly transition into an industry sector that values them. Additionally, industry employer recruitment, retention, and training costs will be reduced, and productivity is likely to increase. Most importantly, the nation will find it easier to attain the economic, environmental, and homeland and national security commitments expected of the U.S.-flagged merchant marine.

About the author:

Mr. Richard Berkowitz is the director of Pacific Coast operations for the Transportation Institute, a non-profit organization dedicated to maritime research, education, and promotion. His work includes several initiatives to train and employ youth, Alaskan Natives, displaced workers, and veterans in maritime positions. While on staff at the Washington State Legislature, he drafted the state's Workforce Investment Act and served as a board member and chair of the Seattle-King County workforce board.

Endnotes:

- ¹ Vice Admiral A.J. Herberger, USN (Ret.); Kenneth C. Gaulden; and Commander Rolf Marshall, USN (Ret.); *Global Reach* (Naval Institute Press, 2015), page 109.
- ² See <https://www.marad.dot.gov/ships-and-shipping/strategic-sealift/maritime-security-program-mssp/>. See www.ustranscom.mil/cmd/docs/Dome_Lines_5th_Edition.pdf.
- ³ Hoover Institution Economic Working Papers: The Decline of American Engagement: Patterns in U.S. Troop Deployments, Tim Kane, Economics Working Paper 16101, January 11, 2016.
- ⁴ In general, the Jones Act prohibits foreign-built or foreign-flagged vessels from engaging in coastwise trade within the United States.
- ⁵ See https://www.marad.dot.gov/copy-of-ds_usflag-fleet20161201/.
- ⁶ Departments of Education, Transportation, and Labor; Strengthening skills training and career pathways across the transportation industry: Data report on future transportation workforce needs, August 2015.
- ⁷ See <http://seafarers.org/jobs/uafaq.asp#2> and Seafarers International Union Manpower Office, Piney Point, MD.
- ⁸ Recruits' Ineligibility Tests the Military, *The Wall Street Journal*, Miriam Jordan, June 14, 2014.



Numbers Matter

As the U.S. maritime workforce dwindles,
so do vital defense sealift capabilities.

by CAPTAIN T. CHRISTIAN SPAIN
*National Assistant Vice President, Government Relations
American Maritime Officers*

On May 21, 2013, I was in room 2167 of the Rayburn House Office Building in Washington, D.C., when Rep. Duncan Hunter, chairman of the Coast Guard and Maritime Transportation Subcommittee, asked Gen. William Fraser, then commander of the U.S. Transportation Command (TRANSCOM), “General, did you use food-aid mariners¹ to crew ships whose capacity you used in Enduring Freedom and Iraqi Freedom?” General Fraser responded, “Sir, when we actually go out and seek merchant mariners, I do not know where they come from.”²

Hold on—what? The general had my full attention now.

Fact-Finding

In the 1980s I went to high school about nine blocks north of this building, and I hadn’t entered the Capitol Hill complex since then. In the time between, I had spent most of 20 years sailing deep sea in the U.S. merchant marine. Today was my

second day on the job as a maritime labor representative in Washington.

I knew that at least 90 percent of all cargo delivered to combatant commanders was transported on U.S.-flagged ships manned by U.S. merchant mariners, so how could TRANSCOM not know where the mariners the armed forces depended upon for sealift operations came from?

General Fraser continued, “Because there is a large pool of merchant mariners from which they reach to obtain both the licensed and unlicensed personnel to crew these ships.”³

That statement, at least, seemed reassuring, as the Maritime Administration (MARAD) and Military Sealift Command maintain a combined surge fleet of 63 vessels in reduced operating status (modified layup with skeleton crews) near major load ports around the nation. When these surge vessels are activated, U.S. merchant mariners on vacation from

their regular commercial shipping jobs man these ships, providing a full complement of officers and crew. Manning the surge fleet requires 1,312 mariners for initial fleet activation, and an additional 1,935 mariners to keep them in operation for more than 120 days.⁴

As the hearing continued, Chairman Hunter asked Gen. Fraser how many mariners TRANSCOM needed to crew the entire surge fleet in a national emergency. He rounded off those numbers and responded that approximately 3,000 mariners would be needed, which was nothing surprising. However, the general went on to say, “Based on the numbers that I have, the merchant mariner pool right now is slightly in excess of 15,000 mariners, of which at any time there are approximately 7,000 or so that are at sea ...”⁵



The Port of Ash Shuaybah, Kuwait. U.S. Navy photo by Journalist 3rd Class Eric L. Beauregard.

This sent the room stirring.

Say What?

The maritime labor representatives who were at the hearing got up and went to the hallway to confer. Where did he get the 15,000 figure? We thought this number was high by at least a few thousand, but we did not have any hard numbers to provide.

As a result of Gen. Fraser's testimony, the presidents of the U.S. merchant marine unions decided a formal manpower study was needed to ascertain the actual number of credentialed U.S. mariners actively sailing and available. Therefore, my first project in my new position became gathering, consolidating, and analyzing the data from the maritime labor groups, MARAD, and any other sources pertinent to the study.

National Maritime Center to the Rescue

Fortunately for us, in 2007, the Coast Guard consolidated all merchant mariner records and documentation functions at the U.S. Coast Guard National Maritime Center (NMC). Prior to 2007, data for government studies was compiled through a voluntary employer system.

Our study⁶ approached the data from three directions:

- First, we combed the NMC's mariner database, searching only for those mariners with International Convention on Standards of Training, Certification and Watchkeeping for Seafarers certification to sail on unlimited tonnage and unlimited horsepower vessels (referred to in the industry as deep-sea vessels). These are the only merchant mariners authorized to operate on large vessels outside of U.S. domestic waters.
- Second, we compiled data from each union's member database.
- Third, we compared the number of billets currently available on deep-sea unlimited tonnage vessels against the NMC data.

The mean age of sailing officers is increasing. Nearly 80 percent of senior officers are eligible for retirement.

The data collected from these three sources was found to have less than a five percent difference; therefore, the NMC data was considered corroborated.

AMO Does Its Part

The maritime industry needs to take action to fill the gap in our officer corps age distribution. As soon as we saw the data on the dwindling merchant mariner supply, the American Maritime Officers (AMO) developed several programs.

- We have been working with the "military to mariner" program for several years to assist those making the transition to the civilian workforce. This allows AMO to have a new input in the 39–45 age range.
- We started a mentoring program for maritime academy students beginning in their sophomore year. Through early identification and counseling, we have eliminated some of the haphazardness associated with an officer's first job.
- AMO developed the engineering candidate hawsepiper program, which takes candidates with a high school diploma to an unlimited third engineer's license in about 30 months. This program, which is unique to AMO, allows us to once again have a steady stream of hawsepipers entering our ranks.

The Pool is Broad, But Not Deep

We concluded that the U.S. merchant mariner pool holding the qualifications to man military sealift vessels was actually more like 11,300. With this relatively low number, the surge fleet could be activated, but sustaining sealift operations for more than one rotation would become a serious problem.

**We don't have a recruitment issue.
We have a retention issue.**

The study also provided some interesting information on the demographics of the U.S. mariner manpower pool. The mean age of sailing officers was 44 in 2008, 45 in 2013, and the number continues to increase. Graphing the age range of active mariners showed a bimodal distribution with a large gap running 35 to 48 in 2008 and 36 to 49 in 2013, which continues to move higher today.

Of greater concern, the senior officers in 2013 were mostly between the ages of 50 and 60, with an average age of 51, meaning that nearly 80 percent of the senior officer corps was eligible for immediate retirement.





Military Sealift Command supply ships are shown moored in the Port of Ash Shuaybah, Kuwait. U.S. Navy photo by Journalist 3rd Class Eric L. Beauregard.

Historically, cargo preference requirements for military and government-impelled cargoes, such as food aid provided by the U.S. government to foreign countries, project cargoes financed with the assistance of the U.S. Export-Import Bank, defense sealift cargoes, and military backhaul have provided reliable cargoes for the U.S.-flagged fleet.

However, over the last 10 years, we have seen historically low volumes of U.S.-preference cargoes for U.S.-flagged commercial vessels operating in international trade (down more than 85 percent from pre-9/11 levels), and the U.S.-flagged share of food-aid cargoes has dropped by 25 percent since 2012. Such losses of cargo contributed significantly to a net loss of more than 66 ships.⁸

So why is this? Where are all the young mariners?

A close look at the industry’s data indicates that the U.S. merchant marine doesn’t have a recruitment issue, but it does have a retention issue.

A Dwindling Supply

For example, my union, American Maritime Officers, estimates that it costs between \$30,000 and \$100,000 to train officers at the 10-year mark. (Junior officer training is at the lower end of that scale; senior officers at the top.) However, across the industry, the U.S. merchant marine retains fewer than 50 percent of academy graduates in deep-sea sailing trades at the 10-year mark. On the other hand, hawsepipers—officers who have attained a license after first sailing unlicensed—have an 80 percent retention rate at the 10-year mark.⁷

However, this presents another problem: Due to the tremendous increase in training requirements imposed on potential hawsepipers, there has been an enormous drop in the number of mariners willing to advance their careers and obtain a license on this track. Union-represented mariners typically have their training costs covered. However, taking a large amount of time out for training prevents a mariner from working and earning a living, and at the same time keeps him or her from spending time with family.

There really is only one solution to the declining workforce problem: more ships. This requires more cargo—*reliable* cargo—for U.S.-flagged vessels to transport.

More cargo = more ships = more mariners.

So, to meet the military’s U.S. mariner manpower needs, MARAD estimates the U.S. will need another 45 deep-sea vessels to establish a mariner manpower pool large enough to man the surge fleet and sustain sealift operations in a time of war, conflict, or crisis.⁹

One Solution, Four Stages

In terms of improving U.S. merchant mariner retention and reducing the mean age of the workforce, we suggest a four-stage approach:

1. Mariners retiring from the military could fill the gap in the bimodal age distribution. For example, the U.S. Army has a great system for helping their mariners obtain STCW-compliant certification.
2. Increasing the number of hawsepipers is probably the single most expensive investment on a per-capita basis.

However, developing Coast Guard-approved programs that produce hawsepipers would go a long way toward solving the retention issue

- and increasing the diversity of the officer population.
3. Identifying and mentoring maritime academy students who want a career at sea would help improve their retention rate. Currently, company human resources departments essentially interview and hire students at the end of their schooling when their primary concern is landing that first job—not setting a course for a 30-year career. Academy graduates often join unions with that same short-term objective. Through mentoring, academy cadets could be made aware of the career paths available to them, opportunities for growth and professional development, and the potential for strong earnings over a complete career rather than just a short-term stint at sea.

Deck Officer Requirements

1996	2016
1. U.S.C.G. License	U.S.C.G. License (MMD)
2. Radar Endorsement	Radar Endorsement
	STCW Officer Endorsement ¹ Training required for OICNW Endorsement: <ul style="list-style-type: none"> • Medical First Aid Provider • Search and Rescue • Terrestrial and Celestial Navigation and Electronic Navigation Systems • Watchkeeping, including COLREGS and IMO Standard Marine Communication Phrases (SMCP) • Basic Cargo Handling and Stowage • Basic Ship Handling • Basic Stability and Ship Construction • Basic Meteorology • Medical First Aid Provider • Visual Signaling • Bridge Resource Management • Leadership and Teamworking Skills • ECDIS
	ARPA Endorsement ²
	GMDSS Operator Endorsement ³
	Basic Training Endorsement
	Advanced Fire Fighting Endorsement
	Survival Craft Endorsement
	GMDSS FCC License ⁴
	U.S.C.G. Medical Certificate
	TWIC ⁵

¹ Standards of Training Certification and Watchkeeping; Officer In Charge Navigational Watch

² Automatic Radar Plotting Aid

³ Global Maritime Distress and Safety System

⁵ Global Maritime Distress and Safety System

⁶ Transportation Worker Identification Card

Source: Commander Kevin S. Cook, USCG, Meeting the Strategic Sealift Needs Of The U.S. With A Limited Merchant Marine (U.S. Army War College Carlisle Barracks, PA, 1999), 18.

4. Outfitting deep-sea vessels with internet connectivity and web access where possible, as the web and the networks it offers are staples in the lives of nearly all younger seafarers. At a minimum, they should have shipboard access to personal email.

The U.S. Needs U.S. Mariners

In my career, I have sailed on ships supporting Operation Desert Storm, the Balkans conflict, North Korean operations, Operation Iraqi Freedom, the 2007 surge, and the European reset of 2008.

There are those who would argue we don't need a U.S.-flagged merchant fleet. But the U.S. is facing threats that will require us to deliver expeditionary forces and cargoes to areas within contested sea space. We can't rely on foreign operators and foreign mariners to put the needs of the U.S. armed forces first in conflicts that may involve parties of interest to their own governments.

Although 25 years ago the U.S. could rely on our NATO allies to supplement sealift, this system no longer exists. In fact, in our most recent conflicts, some of our NATO allies, including the United Kingdom, have asked the U.S. to provide sealift for their forces.¹⁰

We need to implement legislation and policies to provide steady cargo to the U.S. fleet, allowing us to sustain at least 255–260 active deep-sea ships so there is a mariner pool deep enough to provide the necessary support in combatting national emergencies and meeting defense sealift needs.

About the author:

Captain Spain worked on more than 20 vessels over two decades, including spending 10 years as master on three different classes of vessels. Captain Spain represents American Maritime Officers in Washington, D.C.

Endnotes:

¹ Food-aid mariners serve as crew on U.S. flag ships contracted to carry food to foreign countries as part of the U.S. government's food assistance program.

² Maritime Transportation: The Role of U.S. Ships and Mariners, House Subcommittee on Coast Guard and Maritime Transportation Hearing, 05/21/2013.

³ Ibid.

⁴ See www.marad.dot.gov.

⁵ Maritime Transportation: The Role of U.S. Ships and Mariners, House Subcommittee on Coast Guard and Maritime Transportation Hearing, 05/21/2013.

⁶ 2013 Joint Maritime Union Manpower Study.

⁷ American Maritime Officers data analysis of 2000 deep sea mariners.

⁸ See www.marad.dot.gov.

⁹ Maritime Administration estimate.

¹⁰ Vice Admiral A.J. Herberger, USN (Ret.); Kenneth C. Gauden; and Commander Rolf Marshall, USN (Ret.); Global Reach (Naval Institute Press, 2015), page 170.



State Maritime Academies

Educating the future maritime workforce.

by REAR ADMIRAL MICHAEL A. ALFULTIS, USMS, Ph.D.
Captain, U.S. Coast Guard, retired
President
State University of New York Maritime College

CAPTAIN ERNEST J. FINK
U.S. Coast Guard, retired

CAPTAIN MARK S. WOOLLEY
U.S. Navy, retired

Key to a vibrant merchant marine is the role the state maritime academies (SMAs) play in educating and training future maritime professionals. These six academies—located in Maine, Massachusetts, New York, Texas, California, and Michigan—produce more than 70 percent of the new U.S. officers licensed to operate vessels of unlimited tonnage and any horsepower each year. Another 25 percent come from the (federal) U.S. Merchant Marine Academy at Kings Point, New York. The remainder work their way up as unlicensed seafarers.

In no other profession do just seven colleges produce the bulk of licensed professionals. As such, over the past decade, the marine academies have enjoyed extremely high enrollment and post-graduation employment rates for licensed

graduates. Even though the number of U.S.-flagged ships in international trade has decreased, there is an increased demand for U.S. licensed mariners, primarily due to an aging maritime workforce.

For example, the U.S. Departments of Labor, Education, and Transportation released a report in August 2015 that identified the need for an additional 40,000 U.S. licensed mariners over the next decade.¹ This shortage of licensed officers is not confined to the U.S. merchant marine. In May 2016, the five-year Baltic and International Maritime Council/International Chamber of Shipping manpower report forecast a serious future shortage in the supply of seafarers, specifically identifying the need for an additional 147,500 officers by 2025 to service the world merchant fleet.²

Gen Z: The Next Generation of Mariners

A new generation is now enrolled in our academies. Our students were born in the late 1990s and are commonly referred to as to “Generation Z (Gen Z).” More than a quarter of the U.S. population belongs to this generation, which differs significantly from its millennial predecessors. They are the first generation to have internet connectivity available at a young age, so they are technologically savvy and use this skill to learn. This will be especially important as technology evolves for “smart ships,” where more of the functions that were traditionally performed at sea are transferred ashore.

Gen Z is also a much more diverse and inclusive generation. Gender roles and norms are blurring from traditional constructs of previous generations, which will change the face and culture of the maritime workforce. Our students are collaborative team



Generation Z is more diverse than past generations. This provides a unique opportunity for state maritime academies to increase diversity, which will inevitably transfer into a more diverse maritime workforce. All photos courtesy of SUNY Maritime College.

Merchant Marine Officer Training Academies

The United States has one federal and six state academies dedicated to the training of merchant marine officers:

United States Merchant Marine Academy (federal)
<https://www.usmma.edu/>

California State University Maritime Academy
<https://www.csum.edu/>

Great Lakes Maritime Academy at
Northwestern Michigan College
<https://www.nmc.edu/maritime/>

Maine Maritime Academy
<http://mainemaritime.edu/>

Massachusetts Maritime Academy
<https://www.maritime.edu/>

State University of New York Maritime College
<http://www.sunymaritime.edu/>

Texas A&M Maritime Academy
<http://www.tamug.edu/corps/>



The U.S. Departments of Labor, Education, and Transportation released a report in August 2015 that identified the need for an additional 40,000 U.S. licensed mariners over the next decade.

players who work together to find solutions to problems. This will bode well for the maritime industry, which relies upon teamwork and a shared concern for shipmates.

In addition, driven by high post-graduation employment rates and earning potential, the SMAs are enjoying unprecedented high demand for enrollment, leading to increased selectivity in the students offered admission. Thus, the Gen Z students entering (and graduating from) the state maritime academies are of higher caliber intellectually, more capable of working in an inclusive team environment, more comfortable with technology, and more capable of adapting to changes in technology. These skills will be especially important, as success will depend on one's ability to learn continuously and to meet the challenges associated with constant change.

Outreach

Like all educational institutions, the maritime academies are seeking to become more diverse, which will inevitably transfer into a more diverse workforce. This will also expand opportunities to work in the maritime industry

“... we need individuals who have a holistic understanding of how systems are integrated and whose thinking is data-driven.” —Christopher Wiernicki
ABS Chairman, President, and CEO

to a greater number of people and help fill the anticipated workforce gap. One way we do this is through outreach to maritime/marine K–12 schools and technology schools in urban port areas.

There are more than 45 maritime and marine science high schools across the country now, with more opening each year.³ These students have already been exposed to the maritime environment, so they are a natural source of interest for maritime training schools, colleges, and industry apprenticeships.

Even so, these schools alone will not solve the anticipated shortages within the maritime workforce. We must work together to better educate K–12 students

about the ladders of opportunity within the maritime industry. While most Americans have almost daily contact with



Given the cyclical nature of the maritime industry, students must prepare for a variety of careers.

the trucking and airline industries, readily understanding their importance, the maritime industry is less noticeable.

Potential Solutions

To better reach these potential students, several of the maritime academies host summer science, technology, engineering, and math and leadership programs to engage with youth, especially those from urban areas. Funding for such programs comes from grants and industry partners. Many companies also have community outreach programs. But there needs to be a greater industry-wide effort to bring all segments together to educate students and teachers about the maritime industry and the opportunities available.

Veterans are another valuable source of energetic, mature employees, so we need to educate them about maritime workforce opportunities, as well. Additionally, we need to make it less onerous for veterans to translate their military experience into the training and assessment requirements necessary for a Coast Guard merchant mariner license meeting the requirements of the International Convention on Standards for Training, Certification and Watchkeeping for Seafarers (STCW). While some progress has been made in this regard, there needs to be greater urgency and cooperation to remove the obstacles hindering a smooth transition for veterans.

Challenges

In addition to recruiting a more diverse workforce that is able to keep pace with rapid changes in the maritime industry, the maritime academies are faced with several other

challenges when it comes to educating the future workforce.

For example, state maritime academies have many masters. First, as institutions of higher education, the state maritime academies must meet stringent accreditation standards for academic programs. In addition, they must also abide by state university policies if they are part of a wider university system. Second, the maritime academies must comply with U.S. Maritime Administration (MARAD) regulations that are derived from federal law. Third, their USCG license programs must adhere to STCW requirements. Further, these various requirements and policies can sometimes conflict with one another, potentially hindering the pace at which the SMAs are able to make curricular changes or changes to their approved licensing programs.

Although programs associated with the unlimited tonnage and horsepower mariner credentials are the most popular programs, given the cyclical nature of the maritime industry, we also focus on the wider maritime industry to prepare our students for a variety of careers ashore. Our license and non-license programs must ensure that students are industry-aware, as the majority of maritime academy graduates sail on their licenses for less than seven years before coming ashore. Today's students need the knowledge and skills to facilitate their progression within various sectors of the maritime industry.

“If you never see anything, how can you dream about it? How can you reach for something that you don't even know is there?”

—U.S. Congressman Elijah Cummings

Another challenge the state maritime academies face is keeping up with the rapid pace of change in the maritime industry driven by technology and/or regulatory changes. In many cases, industry has been willing to assist the SMAs by providing expertise through industry expert lectures; supporting

and sponsoring faculty positions; and donating state-of-the-art equipment such as simulators, modern diesel engines, and deck and engine simulators and labs. The more support we receive from industry and our alumni, the better our students will be prepared to enter the maritime industry.

Additionally, if industry wants to ensure that cadets have special qualifications or endorsements (such as dynamic positioning or liquefied natural gas propulsion), it would be mutually beneficial for the industry to support the academies financially to enable our students to complete these qualifications prior to graduation.

An Aging Fleet

One of the most urgent challenges the state maritime academies face is the age of our training fleet. MARAD owns these ships, as federal law and regulations specifically authorize the Department of Transportation to provide the SMAs suitable ships, but with an average age of 37 years, the SMA training vessels are aging out. The oldest is SUNY Maritime's USTS *Empire State VI*, which is 55 years old and nearing the end of its service life.⁴ SUNY Maritime is the largest of the six state maritime academies, and the potential loss of its ship would ripple throughout the entire American maritime industry, as there is not enough capacity on the remaining SMA training ships to accommodate all our cadets.

Further, these ships are used for more than training future maritime professionals. The SMA vessels are also essential for federal humanitarian and disaster relief efforts. For example, the Massachusetts Maritime Academy and SUNY Maritime College ships housed disaster relief workers for an extended period during the Hurricane Sandy clean-up effort. These vessels have also been used for international humanitarian missions and to support Department of Defense missions.⁵ This relieves U.S. Navy ships of missions that would further impact their heavy operational and personnel tempo.

In the past, the Maritime Administration converted training ships from the ready reserve force, funded by congressional earmarks that are no longer available. All SMA training ships will need to be replaced over the next decade, and MARAD is working on a proactive programmatic approach to recapitalize these aging national assets with the national security multi-mission vessel (NSMV) fleet. These vessels will be designed as multi-mission assets—for humanitarian/disaster relief and as state maritime academy training ships. NSMV construction will also help maintain U.S. shipbuilding capacity and the associated skilled workforce critical to national defense and our economy.

The Most Important Ship — Partnership

Maritime workforce issues cannot be solved without strong partnerships among government, industry, and educational institutions. The SMAs will continue to work closely with the Coast Guard and MARAD to ensure new training requirements are practical, reasonable, and can be streamlined into existing academy programs. Concurrently, we need to work with maritime industry leaders to fully understand their future needs regarding personnel, training, and new



Partnerships and donations from the maritime industry are key to ensuring students are exposed to the latest technology and workforce ready. Pictured here is the Bouchard Transportation Company Tug and Barge Center simulator at SUNY Maritime College.

technology. It takes four years for our cadets to earn their degrees and licenses. As the pace of technological change increases, we need to examine our processes to ensure we can adjust our curricula and obtain the necessary approvals from government agencies to make sure our graduates are workforce ready.

About the authors:

United States Maritime Service Rear Admiral Michael A. Alfultis is currently the president of the State University of New York Maritime College. He retired from the U.S. Coast Guard at the rank of captain after 28 years of service.

Captain Ernest J. Fink, USCG (Ret.), is the dean of maritime education and training at the State University of New York Maritime College. He retired from the Coast Guard in 2007 following a 32-year career in the marine safety program.

Captain Mark Woolley, USN (Ret.), serves as the chief of staff at the State University of New York Maritime College.

Endnotes:

- ¹ U.S. Department of Education, U.S. Department of Transportation, and U.S. Department of Labor, *Strengthening Skills Training and Career Pathways Across the Transportation Industry: Data Report on Future Transportation Workforce Needs*, 2015.
- ² BIMCO, "BIMCO/ICS Manpower Report Predicts Potential Shortage of Almost 150,000 Officers by 2025," 2016.
- ³ Maritime for Primary and Secondary Education Coalition, *Primary and Secondary Schools With Maritime and/or Marine Science/Technology Programs*, found at www.mpsecoalition.org.
- ⁴ The State of the U.S. Maritime Industry: The Federal Role: Hearings before the Committee on Commerce, Science and Transportation Subcommittee on Surface Transportation, and Merchant Marine Infrastructure, Safety, and Security, Senate, 114th Cong. 6 (2016) (testimony of Paul N. Jaenichen). Retrieved from <http://testimony.ost.dot.gov/test/jaenichen1.pdf>.
- ⁵ United States Congressional House Committee on Armed Services, Subcommittee on Seapower and Projection Forces. *Hearing on Logistics and Sealift Force Requirements and Force Structure Assessment*, July 30, 2014.



From Sailing Ships to Microchips

This isn't your parents' merchant marine.

by Ms. KATHY J. METCALF
President and CEO
Chamber of Shipping of America

Nearly 40 years ago, I walked up my first gangway as a new third mate, ink still wet on my license. There was only a radar observer endorsement on that license—no basic safety training, no GMDSS, no bridge management endorsements or any of a number of other endorsements that are in play today. Back in the day, crewmembers—licensed and unlicensed—helped the newbies “learn the ropes.”

So what's different today, and how does that impact today's mariners? Even more importantly, what does the future hold for today's and tomorrow's mariners? What new challenges, technologies, and innovations will significantly change the skill sets needed to enable competent mariners to operate tomorrow's vessels in a safe and environmentally responsible manner?

Experience Through Mentoring

For a variety of reasons, many justified, governments of the world have agreed on the need for more detailed regulatory

frameworks to enhance safe and environmentally responsible ship operations, including those directly applicable to mariners themselves, like the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), 1978, as amended, and the Maritime Labor Convention, 2006.

While these regulatory frameworks can most certainly establish the basic requirements on any of the multitude of regulatory issues at hand, in my opinion, they certainly can never be viewed as a replacement for experience through mentoring. Plainly put, training to understand new requirements is a critical foundation. However, putting them into practice aboard vessels requires training and mentoring from senior officers.

Let's take STCW, for example. How did we succeed back in the old days, without the multitude of endorsements?

The obvious answer is that back in the day, senior officers took the newbies under their wings. You didn't learn ship handling or bridge management in a classroom—you learned it by observing mariners who had done it for years. Given the complexity of all these tasks, it worked. Senior officers handed down their skills to the next generation through example and then by doing, all with the appropriate supervision. With regard to today's mariner training requirements, the regulatory framework should supplement onboard experience, but in my opinion, it cannot and should not ever replace it.

New Technology Requires New Skills

That said, new hardware and software, ever-changing technologies, and expanding operating scenarios and geographies will further demand more



Photo by Alex Kolokythas Photography/Shutterstock.com.

effective mariner training in the classroom and aboard vessels. The fundamental questions are:

- How do these expectations affect mariners and the shoreside staff who support those mariners?
- How can today's mariners meet these daunting challenges and additional duties?

With the advent of modern communications, including the internet and social media, the shipping industry is more visible to the general public than ever before. Regrettably, the visibility is not usually associated with positive issues, but rather with negative events—loss of life, environmental impact, etc. Shipping is squarely in the spotlight of regulators at all levels of government, including the international level. These initiatives are not expected to slow down, as evidenced by recent initiatives on greenhouse gases, Polar Code development, regulations addressing alternative fuels, and hull biofouling/impact on invasive species, to name a few. Add to this safety- and security-related regulatory programs, including e-navigation, piracy, refugees at sea, STCW, the Maritime Labor Convention, and cybersecurity, and compliance challenges become daunting.

Challenges

Sailing on ships is not a risk-free profession. Between cargo operations, sea and weather conditions, and the duty cycle, there is no question that being a professional mariner is challenging.

We must also address the impact of current and potential initiatives on mariners. We seem to have a comfort level provided by multiple training requirements on a number of issues, as embodied in the STCW, but does “book knowledge” or a shipboard training program equate to real proficiency?

Knowledge plus experience equates to competency, and in my opinion, the only way the critical experience factors can be developed is by having senior mariners mentor their junior counterparts. We must never forget that without adequately trained and experienced mariners, the ultimate goal of safe and environmentally responsible ship operation is impossible, even with an aggressive, focused shoreside management team and a library full of new regulations.

Smart Regulations

So how does this relate to the shipping business? Ship owners must be confident that their mariners have the tools and training to do their jobs. Meeting this goal is complicated, given new international, national, and sub-national regulations, as well as the potential for conflicting regional and local requirements.

Failure to take these issues into account is a recipe for compliance disaster. Make no mistake, these issues are worthy of the attention they are getting from regulators—but we have to ask the question: How do ship owners and mariners juggle their primary role of safe and environmentally responsible sea transportation of goods with the challenges inherent in regulation compliance?

I don't mean to suggest that regulations are not helpful and necessary, but they must be “smart” regulations that accomplish a stated goal. Smart regulations become a performance floor for the global maritime industry, but they should by no means be viewed as the be-all and end-all.

At the Deckplate Level

Currently, and most certainly in the future, we must consider human factor issues. For example, never before has the mariner had the tools found on today's modern bridge. Electronic chart display and information systems, collision avoidance systems, space-age communication systems, and the like are all wonderfully productive tools for decision making. However, at last check, bridges were still required to have windows, and we must be certain that today's and tomorrow's mariners remember to use them.

Further, new regulations and tools are of limited value unless the mariner is able to integrate the vast amount of information from all these operational tools, apply principles of good seamanship, and filter it through the most high-powered (and old-fashioned) tool of all—the human brain. This stands true regardless of whether we are talking about past, current, or future challenges.

As we look to the future, we must take past lessons to heart, learn from them, and not repeat past mistakes. For example, we must remember that the single most important operating component of a vessel is its people. The human factor and the manner in which mariners interact with their operating environment and each other must be the focus of all regulatory requirements—safety, security, human factor, or environmental.

Collaboration between regulators and the regulated community will ensure that new regulations are smart regulations—ones that take into account the impact on vessel operations and, most importantly, the mariners who implement them.

About the author:

Ms. Kathy Metcalf is president and CEO of the Chamber of Shipping of America. She previously served as its director of maritime affairs. Ms. Metcalf is a graduate of the U.S. Merchant Marine Academy, with a B.S. in marine transportation and nautical sciences, and holds a J.D. from the Delaware Law School.



The 21st Century Maritime Industry

Tools for mariners in the
offshore energy support industry.

by MR. RICHARD WELLS
Vice President
Offshore Marine Service Association

Today's offshore supply vessel (OSV) master is typically male, over 55 years old, resides in a southern state, earned his mariner credential via the hawsepipe (onboard practical training rather than from a maritime academy), and has other family members who are current or former OSV crewmembers.

I believe the OSV mariner of tomorrow will:

- need more formal training,
- be more diverse in all forms,
- need more education (not the same as training), and
- require more skill assessments.

Training

Including International Maritime Organization requirements and the requirements of our industry's customers (offshore lease holders), the quantity of formal job or equipment-specific training has steadily increased over the last decade.

For example, today's deck officers must complete training on dynamic positioning (DP) system operation under customer and vessel owner requirements. As more national and international regulatory interest is directed toward safe DP systems operation, it is expected that training requirements will expand to additional crewmembers, such as engineers. Additionally, we can expect existing DP training to become more structured, robust, and verifiable.

Diversity

With increasingly higher regulatory standards to qualify for a mariner credential, it will be necessary for offshore supply vessel operators to expand the search pool when seeking potential marine employees. This could include more mariners from the armed services, more maritime academy graduates (especially for OSVs over 6,000 gross tons), more women, more minorities, and more non-local candidates.

It is also possible that age diversity will begin to appear, as the current group of predominantly older mariners retire from the workforce and are replaced by more varied age groups.



Photo by HitManSnr/Shutterstock.com.

Education

While hawsepipe training developed great boat-handling skills, it did occasionally slight administrative, computer, and leadership skill development. As formal training and technology training needs increase, it is likely that a workforce with more formal education will be needed to absorb the increasing knowledge and skills that the larger and more technologically advanced OSVs demand.

Skills

While navigating by the seaman's eye or long-range navigation worked well in the past, today many OSV deck officers are expected to be skilled in dynamic positioning, radar, the electronic chart display and information system, the Global Maritime Distress and Safety System, radio, automated logistic systems, and other emerging devices.

Even as a training class can help a student learn the required operational theory, only hands-on practice and formal assessment can build the skills needed to rapidly and correctly use these powerful tools. With the increasing



Photo by HellHead/Shutterstock.com.

requirements for competency demonstrations in vessel and customer safety management systems, more assessment and verification for vessel operational skills is nearly certain.

In Sum

When all is said and done, the ability to operate out of sight of land and away from family and home for weeks at a time will remain the primary skill separating a mariner from all other workers. Further, serving as an OSV crewmember will remain a well-paying career that does not always require a four-year college education, yet provides significant time at home and is not a 9-to-5 desk job.

About the author:

Mr. Richard Wells has worked in the maritime field for more than 37 years. He is the vice president of the Offshore Marine Service Association. Prior to this, he served 20 years with the U.S. Coast Guard, where he supervised the U.S. Coast Guard regional examination center in New Orleans, Louisiana, and was a Standards for Training, Certification and Watchkeeping training course instructor.

Note:

Statistics courtesy of the Offshore Marine Service Association.



Photo by Alan Smillie/Shutterstock.com.

The U.S. Passenger Vessel Industry

Recruiting and retaining 21st century mariners.

by CAPTAIN MARGO MARKS
former President
Passenger Vessel Association

The domestic U.S. flag passenger vessel industry is made up of more than 6,300 vessels, ranging from small offshore fishing and whale-watching vessels, to harbor excursion vessels, all the way up to large ferry systems that carry thousands of passengers a day.¹

There are a significant number of workforce development challenges facing our diverse industry in the 21st century. We have an aging workforce and face difficulty recruiting the new generation of workers, which makes finding a robust pool of qualified mariners critical to orderly succession planning and ongoing safe business operations.

The Current State

The passenger vessel industry is actively engaged in developing solutions to the obstacles surrounding attracting and retaining this new generation of mariners to our industry. While the workforce pool among passenger vessels varies widely across the country, there are some common themes when it comes to our mariners.

For example, we see more locals seeking employment with our companies. They tend to be more familiar with navigating in the area and appreciate the ability to go home every night. Our captains generally come from within the company or from referrals of similarly qualified individuals. Many operators train mariners in-house, starting people off as deckhands to work their way up on the vessel and in the company.

We see people of all ages and backgrounds becoming interested in working in the marine industry. Some of our industry captains and deckhands are starting on their second careers following professional positions as teachers, doctors, or lawyers. Further, the seasonal and part-time work offered by domestic passenger vessel operators allows individuals to hold other jobs throughout the year or to attend school.

Challenges

That said, the seasonal nature of the majority of the domestic passenger vessel fleet can also be our greatest challenge. Many qualified mariners stay away from seasonal work. Part-time employees interested in full-time work leave when it's not available through their current employer.



Tour boats line up along the Chicago River. Photo by Noel Powell/Shutterstock.com.

Compensation and benefits sometimes do not match the income needs of the individual, and many qualified mariners choose a greater salary over the ability to stay closer to home.

Further, the physically demanding nature of the work, combined with the need to be customer service-oriented and a good communicator, also weeds out a number of potential employees—in most other maritime industries, cargo doesn't talk back.

There are also challenges when it comes to retaining good employees. I hear from other Passenger Vessel Association members that company loyalty (or, rather, lack thereof) seems to be more of an issue now. Employees are more transient; this is often associated with the millennial generation. Typically this demographic



Top: Biscayne Bay, Florida, sightseeing tour aboard a cruise ship. Photo by Kamira/Shutterstock.com.

Above: Whale watching boats in historic Bar Harbor, Maine. Photo by Leonard Zhukovsky/Shutterstock.com.

Tourists in San Francisco getting ready to go sightseeing on the bay. Photo by Mike Brake/Shutterstock.com.

constantly seeks out new positions or experiences, generally averaging no more than a couple years in any one job with any one company.

Recruitment and Retention

Passenger vessel operators have implemented a variety of business practices to successfully recruit and retain employees. In my operation, we offer a competitive benefits package and continue most benefits even while employees are on layoff. Many other companies also provide a combination

of competitive salaries, benefits, and incentive programs to decrease turnover and increase longevity with the company. Operators also work with employees to accommodate family needs and time off requests.

Finally, organizational culture is important. Creating an environment that people enjoy working in, fostering team cohesiveness, and coaching toward continuous improvement and career growth are all key to keeping the modern mariner in our passenger vessel industry.

About the author:

Captain Margo Marks is president of Beaver Island Boat Company, a ferry service in northern Lake Michigan, and was the 2016 president of the Passenger Vessel Association, as well. She is a U.S. Coast Guard-licensed first-class pilot, Great Lakes/inland water mate of any gross tons. She also holds a B.A. in business and is a member of the Great Lakes Captains Association as well as the International Shipmaster's Association.

Endnote:

¹ USCG Marine Information System for Law Enforcement database, as extracted on April 22, 2016.

Coast Guard and Industry Partnerships

Working together to develop regulations.

by CAPTAIN ANDREW MCGOVERN
Sandy Hook Pilots Association

The Merchant Marine Personnel Advisory Committee (MERPAC) was established in the early 1990s as a discretionary federal advisory committee to help ensure ships were manned by qualified personnel. It became a statutory committee in 2014 to continue to give advice to the Coast Guard on matters relating to personnel in the U.S. merchant marine, including training, qualifications, certification, documentation, and fitness.

U.S. Coast Guard Federal Advisory Committees

Under the Federal Advisory Committee Act (FACA) of 1972, special emphasis is placed on the public actively participating in the federal government's decision-making process. The Coast Guard has 11 Federal Advisory Committees, and can be found on www.homeport.uscg.mil, the FACA database at www.facadatabase.gov, and various Federal Register dockets at www.regulations.gov.

Commercial Fishing Safety Advisory Committee (CFSAC)

Chemical Transportation Advisory Committee (CTAC)

Great Lakes Pilotage Advisory Committee (GLPAC)

Lower Mississippi River Waterway Safety Advisory Committee (LMRWSAC)

Merchant Marine Personnel Advisory Committee (MERPAC)

Merchant Mariner Medical Advisory Committee (MEDMAC)

National Maritime Security Advisory Committee (NMSAC)

Navigation Safety Advisory Committee Council (NAVSAC)

National Boating Safety Advisory Council (NBSAC)

National Offshore Safety Advisory Committee (NOSAC)

Towing Safety Advisory Committee (TSAC)

Membership

Nineteen committee members represent the maritime industry:

- Nine U.S. merchant mariners, including:
 - three deck officers representing the viewpoint of merchant marine deck officers, of whom two are licensed for oceans any gross tons; one is licensed for inland or river routes with a limited or unlimited tonnage; two with a master's license or a master of towing vessels license; one with significant tanker experience; and, to the extent practicable, one represents the viewpoint of labor and another represents a management perspective;
 - three engineering officers representing the viewpoint of merchant marine engineering officers, of whom two are licensed as chief engineer any horsepower; one is licensed as either a limited chief engineer or a designated duty engineer; and, to the extent practicable, one represents a labor viewpoint and another represents a management perspective;
 - two unlicensed seamen of whom one represents the viewpoint of able seamen; and another represents the viewpoint of qualified members of the engine department; and,
 - one pilot who represents the viewpoint of merchant marine pilots.
- Six marine educators, including:
 - two representing the viewpoint of state maritime academies,
 - one who represents either the viewpoint of the state maritime academies or the U.S. Merchant Marine Academy,
 - three marine educators representing the viewpoint of other maritime training institutions, one of whom represents the viewpoint of the small vessel industry.

Recommendations

Some of the latest issues MERPAC has dealt with or continues to tackle to help bring the U.S. maritime industry into the 21st century include:

The 2010 amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended. The Merchant Marine Personnel Advisory Committee provided input to the Coast Guard during the entire IMO review to aid in formulating the U.S. position.

The Maritime Labor Convention (MLC) 2006. The committee recommended that the U.S. ratify the MLC and outlined the areas of concern presenting the greatest challenge for industry compliance, including recommendations for joint resolutions.

Recommended Practices for the Safe Operation of Dynamically Positioned Vessels in the Outer Continental Shelf. MERPAC worked with the National Offshore Safety Advisory Committee to develop the recommendations regarding best practices, experience, and training.

Training Requirements Onboard Natural Gas-Fueled Vessels. MERPAC recommended a single training approach for ships operating in international and domestic trade, which became the U.S. position to IMO when negotiating the amendments to the STCW Convention.

Apprentice Mate/Steersman Training Program. The Towing Safety Advisory Committee and MERPAC worked together to submit recommendations to assist the Coast Guard in resolving apprentice mate/steersman training issues as well as the towing industry's mariner retention challenges.

Development of Competency Requirements for Vessel Personnel Working Within the Polar Regions. The Merchant Marine

Personnel Advisory Committee developed competency requirements for personnel working on vessels within the polar regions. These recommendations became the basis for a Coast Guard domestic policy letter and the U.S. positions to IMO when negotiating the amendments to the STCW Convention.

Mariner Occupational Health Risk Study Analysis. MERPAC, with the Merchant Mariner Medical Advisory Committee, reviewed mariner duties to determine whether the current medical evaluation should be retained, or whether the evaluation should be varied based upon the applicant's endorsement.

Review of the International Maritime Organization's Model Courses. MERPAC is reviewing the IMO draft model courses to provide input to the Human Element, Training, and Watchkeeping (HTW) Subcommittee U.S. delegation's positions.

Update of the International Maritime Organization's Maritime Safety Committee guidelines on fatigue mitigation and management. The Merchant Marine Personnel Advisory Committee is currently considering various international discussions and the subsequent submissions to the HTW Subcommittee.

Review of policy documents providing guidance on the implementation of the 2013 STCW rulemaking. MERPAC evaluated and made recommendations to the Coast Guard on improvements to the Navigation and Vessel Inspection Circulars relating to the implementation of the final rule.

Utilizing Military Education, Training, and Assessment for STCW and National Certifications. MERPAC worked with military services to identify U.S. military education, training, and assessments meeting STCW requirements.

- Two individuals representing the viewpoint of shipping companies employed in ship operation management.
- Two members of the general public.

Extended Participation

MERPAC's membership is just the tip of the iceberg with regard to its merchant marine representation. All committee meetings are open, and the public can influence the committee's Coast Guard recommendations. For example, Merchant Marine Personnel Advisory Committee subcommittees are always chaired by a MERPAC member, but in most cases they are primarily populated by members of the public. These subcommittees will eventually submit draft recommendations to the full committee for action at its meetings.

The expanded knowledge base and experience as well as increased energy resulting from public participation has produced better and more inclusive recommendations over the years. MERPAC would not be as effective if not for public participation, as the committee's 19 members, while diverse, cannot possibly be expected to be knowledgeable in all subject matters.

MERPAC has also worked with other advisory committees on issues that transcend the purviews of multiple committees. For example, we have worked with the National Offshore Safety Advisory Committee on dynamic positioning officer training and certification. We have also worked with the Towing Safety Advisory Committee and the Merchant



From the Desk of the ADFO

by MR. DAVIS J. BREYER
*Alternate Designated Federal Officer
Marine Transportation Specialist
Maritime Personnel Qualifications Division
U.S. Coast Guard*

In its most recent fiscal year (Oct. 2015–Oct. 2016), MERPAC made more than 80 recommendations, with an 81 percent acceptance rate. The remaining 19 percent, while not accepted, still served an important function, providing much important information that had a potential effect on domestic laws, rulemakings, and policies; international requirements; and the Coast Guard’s interaction with the public.

For more than 22 years, MERPAC has served the maritime industry as a forum where maritime shipping companies, unions, training institutions of all sizes, and all mariners from all industry sectors can voice their opinion directly to the Coast Guard regulation, policy, and implementation personnel who set the standards required to be considered a competent mariner.

More than that, participants can become a part of the process, giving additional consideration to how a particular regulation, policy, or implementation process affects them.

To the present and past Merchant Marine Personnel Advisory Committee members and the attending public, we offer a sincere thank-you for your participation—it has made a difference. We couldn’t do the work without you.

About the author:

Mr. Davis Breyer has been working in the Maritime Personnel Qualifications Division at U.S. Coast Guard headquarters since 2010. He is a licensed master mariner with more than 20 years aboard LNG carriers. He has also worked as a marine educator and currently serves as a member of the U.S. Delegation to the IMO Subcommittee on Human Element, Training and Watchkeeping.

Mariner Medical Advisory Committee on many complementary credentialing, training, and fitness projects.

Recommendations

The partnership between the Coast Guard and the Merchant Marine Personnel Advisory Committee has been—and continues to be—extremely effective in furthering, promoting, and protecting the U.S. maritime industry. It has done so primarily through non-regulatory solutions; however, when needed, the committee has provided recommendations on domestic laws and regulations as well as international requirements.

At their very first committee meeting, for example, tasks included physical standards for mariners, simulation and third-party testing, and examination questions. Since then the committee has assisted the Coast Guard in developing

the U.S. position on International Maritime Organization and International Labor Organization issues as well as implementing instruments.

On the domestic side, MERPAC has made recommendations covering a wide range of concerns, including manning levels, credentialing, radar certification, and physical evaluation guidelines for merchant mariner credentials.

About the author:

Captain Andrew McGovern is a marine pilot and has been a member of the Sandy Hook Pilots Association for more than 30 years, many of them as a member of the board of trustees. He was appointed as a member, and subsequently as chair, of the Merchant Marine Personnel Advisory Committee. As chair, Andrew has served as a member of the U.S. delegation to the Standards of Training and Watchkeeping and the subsequent Human Element, Training, and Watchkeeping IMO subcommittees.



Maintaining a Vibrant U.S. Maritime Workforce

Challenges and proposed solutions.

by MR. PAUL JAENICHEN, SR.
former Maritime Administrator
Maritime Administration

America's rich, often turbulent history and economic growth has always been indelibly interwoven with, and deeply dependent upon, the strength and influence of the U.S. merchant marine. Dating back to the late 1700s, when merchant mariners transported the goods that sustained the colonists as they forged a new nation, to the present-day benefits it affords our nation, the merchant marine has been a major force in making the United States a superpower.

A Proud History

The merchant marine's role in our nation's security and growth was recognized as early as 1775, when the first Congress granted a tax break to U.S. shipping importers and exporters, encouraging them to transport all of their cargo on U.S.-made vessels manned by American seafarers. Nearly 200 years later, having fueled the westward expansion and transformed our coasts and inland waterways into boundless commercial conduits—while also defending our nation in multiple wars—the merchant marine was granted direct federal support through the Merchant Marine Act of 1936. That legislation underscored the need to ensure a robust merchant marine and mandated that a substantial portion of foreign commerce should be carried on U.S.-flagged ships.

After merchant mariners served heroically in World War I, supporting our nation's economy and sustaining the war effort, World War II brought yet another opportunity for service, which was won largely on the backs of the U.S. merchant marine. However, by 1970, Congress enacted new legislation in response to a dramatic decline in the number of U.S.-flagged vessels following the end of WWII, approving massive shipbuilding subsidies. This allowed private maritime industry to grow and develop, pioneering massive container ships that now dominate the oceans and, more

recently, engineering new, clean, energy-efficient propulsion options like liquefied natural gas-fueled ocean-going ships.

National and international shipping helped grow America into a global economic force while supporting massive troop deployments in Korea, Vietnam, Iraq, and Afghanistan. The merchant marine also provided unprecedented essential humanitarian assistance in a series of disasters: September 11, 2001; a devastating earthquake in Haiti; massive hurricanes Rita and Katrina along the Gulf Coast; and Super Storm Sandy, which severely damaged New York and New Jersey.

Current Struggles

Today, the U.S. merchant marine continues to provide humanitarian support and food aid to war-torn nations and refugee outposts across the globe. Even so, the tides of maritime history continue to shift, and the industry today finds itself again at a critical crossroads, poised between a glorious past and an uncertain future.

Today, less than two percent of our international cargo is carried on U.S.-flagged ships.

The U.S.-flagged fleet of globally trading ships has gone from 106 vessels in 2012 to just 79 today. That 27 percent decrease (representing a loss of more than 2,400 seafaring jobs) reflects an alarming trend for an industry penalized by high costs, plummeting prestige, public and congressional indifference, a struggling port and maritime infrastructure, and a fleet of training vessels well past their prime.

Perhaps the most telling factor is that today less than two percent of our international cargo is carried on U.S.-flagged ships. And even while we are blessed with the world's most enviable network of rivers, lakes, and waterborne transportation corridors, this nation moves only six percent of its domestic freight by water.

While we are blessed with the world's most enviable network of rivers, lakes, and waterborne transportation corridors, this nation moves only six percent of its domestic freight by water.

These unpleasant trends coincide paradoxically with skyrocketing domestic and international freight volumes and intensifying global competition for available cargoes. They accompany highways choked with traffic and overloaded by a rapidly growing population. At a pivotal moment in its history, the nation has once again lost touch with its life-sustaining maritime roots, seemingly heedless of the maritime industry's enormous potential to relieve—if not resolve—many of these escalating pressure points.

Declining Sealift Capacity

In dealing with these many challenges, the Maritime Administration (MARAD) operates under one mandate: to guarantee America's ability to deploy military forces anywhere in the world on short notice and sustain them while they are in theater through logistical support.

Our forefathers certainly understood the importance of this. With the world's largest oceans at our three coasts and the planet's biggest freshwater lakes on our northern border, they foresaw that the U.S. needed to build and maintain a vibrant maritime industry. This is still true today, but rather than forging ahead with a fortitude and foresight borne of two centuries of proven success, our generation is instead witnessing a dramatic and potentially disastrous decline in the strength and vitality of the U.S. maritime sector.

The rapid decline in the U.S.-flagged fleet has also captured the attention of U.S. military leaders, some members of Congress, and federal transportation leaders. Of the world's 36,000 large deep-sea merchant ships of 1,000 gross tons or larger in international registries, only 79 today fly the U.S. flag. Another distressingly small fleet of 91 U.S.-flagged ships are registered for U.S. coast-wise trade. The fact that this has all happened in a stunningly short interval is particularly alarming. Since January 2010 alone, 58 large ocean-going ships (about 20 percent of the fleet) in international and domestic trades have departed the U.S. registry.

Of the world's 36,000 large deep-sea merchant ships of 1,000 gross tons or larger in international registries, only 79 today fly the U.S. flag.

What is the reason for this precipitous decline? The answers are complex, but, not surprisingly, are tied to simple economics. Suffice it to say that the owners of U.S.-flagged vessels find it challenging to make a profit—or at least keep losses to a minimum—flying the U.S. flag.

Compared with transporting cargo on ships operated by other nations, it simply costs more—often much more—to sail U.S.-flagged vessels manned and operated by American mariners. The U.S. maritime industry, for example, upholds health and safety standards that many other nations largely ignore, and which cost more to enforce. We also pay our seafarers more due to our nation's cost of living. Consequently, many ship owners choose to fly “flags of convenience” due to the lower operating costs and tax benefits enjoyed.

Declining Mariner Workforce

The declining U.S. sealift capacity has created a troubling domino effect, leading to a dramatic drop in the mariner workforce. This drop includes an already aging and shrinking pool of experienced mariners fully qualified to operate large seagoing vessels. Again, the causes are complex and to some degree interdependent, but in a very short amount of time, as noted earlier, the industry has lost more than 2,400 jobs—a stunning number with far-reaching implications, given the small size of our U.S.-flagged fleet.

It means, for one, that the nation barely has enough qualified mariners—about 11,280—to crew existing government-owned sealift vessels. These are the vessels that would lead an initial surge of equipment and supplies to deploy our

troops to defend our national interests, but anything beyond an initial surge would leave the fleet quickly undermanned and our troops potentially in jeopardy.

Moreover, given that it takes about 10 years for a new sea-

farer to gain the credentials and experience needed to become master of a ship or rise to chief engineer, one thing is certain: Tomorrow's mariners are simply not entering the workforce pipeline today at a rate sufficient to meet domestic needs—present or future. Add to this a growing trend of young mariners leaving the industry prematurely for other professions, and the challenges of recruiting, training, and retaining qualified seafarers become painfully clear.

These workforce challenges are compounded by the unique set of qualities required of successful merchant mariners. These highly skilled men and women are typically characterized by self-discipline of the highest order, a willingness to be separated from family for prolonged periods under

stressful circumstances, and simple common sense, often called a “seaman-like manner.”

In a high-tech world, moreover, modern merchant mariners must also be tech-savvy, multi-skilled, and ideally possess cross-cultural or even multilingual abilities. Whereas licensed officers once served on any commercial ship of a certain size, international regulations now mandate specific additional certifications for specialized ships like LNG carriers, oil tankers, and chemical carriers. This makes crewing ships a challenge and underscores the importance of both recruiting and educating the best and brightest young candidates.

Recruiting the Next Generation Mariner

Given the challenges of recruiting the younger generations to maritime professions, we must pay attention to education and recruitment in the public schools. The maritime community must redouble its efforts to spread the good news about the industry to upcoming generations so that they may fully appreciate the importance of a career in the U.S. merchant marine.

Further, we must not only recruit and train young mariners—we must prioritize and protect their future maritime employment. Mariners’ jobs take years to develop, and once they are lost, they won’t be coming back!

The National Security Multi-mission Vessel

Educating merchant mariners would be incomplete, of course, without extended time at sea aboard actual ships, which speaks directly to MARAD’s mission.

We must act immediately to provide uninterrupted availability of licensed merchant mariners to operate U.S.-flagged vessels in commercial and military operations, and to sustain shipbuilding and repair capability in support of U.S. economic and national security. These multiple challenges call for a multifaceted approach, which MARAD is addressing through a number of measures:

- enforcing U.S.-flagged cargo preference quotas;
- providing direct stipends to retain militarily useful vessels in the commercial fleet;
- collaborating with ports and state transportation agencies;

In a high-tech world ... modern merchant mariners must also be tech-savvy, multi-skilled, and ideally possess cross-cultural or even multilingual abilities.

Where are the Young Mariners?

Many young mariners leave the profession early, before they gain the experience needed to rise to the senior ranks, simply due to the lack of traditional appeal for a career at sea among the millennial generation. The exodus is tied to personal and quality of life reasons.

A ship is a unique environment. It is not only a workplace, but also a mariner’s dwelling for potentially months at a time. This self-contained environment can cause even small difficulties and discomforts to become magnified. Coupled with extended periods away from loved ones, the rigors of sea life discourage many from seriously considering a long-term maritime career.

Recruitment Challenges

The Maritime Administration has tracked this trend for some time and is deeply invested in recruiting bright young cadets to learn, serve, and grow into the experienced, fully credentialed mariners needed to fill a host of maritime positions already in critical demand.

It is not an easy task. The allure of adventure once tied to a seafarer’s life has all but disappeared.

A globalized economy and the relatively invisible role mariners play within it have altered the seafaring landscape. Shipping operations, while still vitally important and, in reality, irreplaceable in our domestic and global economy, today sail silently, facelessly, beyond the public eye, and, in their continual feeding of global supply chains, effectively off the grid.

The vanishing charms of the 21st century maritime industry, therefore, have triggered a worldwide shortage of merchant mariners, which is bad news for an interdependent global economy and even worse news for U.S. commerce and national security.

- providing millions of dollars in diverse funding streams, grants, and loans to help modernize maritime infrastructure and boost domestic commercial enterprise;
- directing enormous energy and resources to promote recruitment, training, and retention for young mariners.

Integral to this effort is recapitalizing or replacing the aging fleet of federal government training vessels that state maritime academies use. MARAD hopes to accomplish

this through its program to design, modernize, or build a national security multi-mission vessel (NSMV).

On average, training vessels at the six state maritime academies are 37 years old. The oldest, *Empire State VI*, at the State University of New York Maritime College, was built in 1962. That's like getting behind the wheel of your great-grandfather's Studebaker! The younger generation is accustomed to the very latest in modern technology, and the prospect of training on an aging (and in some cases, less-than-fully functioning) training vessel is quite unappealing.

The proposed NSMV is a high-tech, modern maritime platform designed as a special-purpose training ship, with further capability to support federal humanitarian response efforts and disaster relief missions. Most importantly, it would serve as a state-of-the-art maritime cadet education and training environment.

MARAD has worked with leadership at the U.S. Department of Transportation to include \$5 million in funding to design this NSMV—a top priority that cannot be overstated. Without the vessel, training protocols will become increasingly compromised, making it harder to recruit and train the next generation of mariners this nation desperately needs. These limitations, already felt, will continue to undercut recruiting and retaining a highly specialized, tech-savvy maritime workforce.

The National Maritime Transportation Strategy

The future holds great challenges as well as exciting opportunities for the U.S. merchant marine. To maximize its opportunities and fulfill its promise, however, our nation has no choice but to rediscover—and *revive*—its great maritime heritage. Today's increasingly overcrowded, congested U.S. landside transportation infrastructure necessitates a significant, ongoing transition to underutilized maritime assets.

Looking Ahead

Our nation's history has repeatedly demonstrated the value and utility of moving freight on the water; of assuring the sealift capacity to support the nation in times of need; and the commitment to train, employ, and retain a highly skilled merchant mariner workforce. As the past has proven, this nation's future rests on the strength and vitality of the U.S. merchant marine.

About the author:

Mr. Paul "Chip" Jaenichen served as MARAD's maritime administrator from July 2014 through January 2017. He was a career naval officer who retired after 30 years as a nuclear-trained submarine officer in the U.S. Navy. He has served as deputy chief of Legislative Affairs; commanding officer of the USS Albany; submarine squadron commander; director, submarine/nuclear officer distribution; and chief, European and North Atlantic Treaty Organization Policy Division. He holds a B.S. in ocean engineering from the U.S. Naval Academy and a master's in engineering management from Old Dominion University.

For more information:

History and statistics courtesy of the Maritime Administration. Visit the website at: <https://www.marad.dot.gov>.

Cultivating Opportunities

The rewards of creating a robust local hire program.

by MR. IRA DOUGLAS
*Director of Marine Personnel
 Crowley Maritime Corporation*

During a recent outreach event in Valdez, Alaska, Crowley port captain Tom Hancock hosted 12 visitors from Yukatat, Alaska, including six students and four other local Alaska Native students from Valdez's Gilson Middle School, for a week of cultural, team-building, and learning activities. Throughout the course of the week, the students toured Crowley's Valdez Office, learned about the Alyeska Pipeline Service Company's ship escort/response vessel system, met several Alaska Native crewmembers, and participated in a crew change where they performed a traditional Yukatat song and drum routine.

Captain Hancock happily reflected upon the week: "It was a pleasure to be a part of their success," he said. "In the future, it would be wonderful to provide more cultural and community outreach programs like this to bring another group of Alaska Native middle school students to Valdez for an 'eye-opening' experience."

As part of the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline, Section 29 mandates a Native Alaska hire requirement. As a contractor for the pipeline, Crowley must comply with this legal requirement, but even beyond that obligation, Crowley has learned that local and native hiring makes good business sense, regardless, in almost all of our operations. There are certainly challenges in creating a robust local hire program in the maritime industry, but the rewards are substantial and worthwhile.

Among the most important decisions for a company are those regarding employment. Hiring the right people plays a huge role in a business's success, and keeping these employees satisfied and engaged improves productivity at many levels, which pays off through improved retention, safety, and quality.

Employee Engagement Survey

To improve this process, Crowley participated in an employee engagement survey, which posed 12 questions deemed a useful measure of employee engagement about

various aspects of work. While results varied substantially from one operation to another, one interesting result was that the Crowley marine operations with a focus on local recruitment experienced higher overall engagement levels in a few key areas.

We rated "high" in overall satisfaction, and employees gave us high marks for the statements:

- At work, I have the opportunity to do what I do best every day.
- The mission or purpose of my company makes me feel my job is important.

Engagement

While we don't have scientific data behind why these specific areas rated higher relative to our other marine operations, it makes sense that local workforces would be more engaged for a few reasons:

- They see the impact of what they do in the community. Take, for example, our Crowley Fuels operation in Western Alaska. Several small communities rely on Crowley to deliver heating oil and goods via our barges. Employees from the area know the company, see their value, and sometimes have experienced that value and service directly. The company is truly a part of the community.
- Local social networks offer pride of workplace. When you know someone who works someplace and they have positive things to say, this idea starts to become part of your subconscious.
- People like to support local interests, and the local area is more aware of the company. Other advantages of local hiring include networking opportunities in the area and a savings in travel expenses for mariners.

Outreach

For these reasons—and despite the challenges in local recruitment, in many instances—Crowley has found it advantageous to invest in community outreach events such



The tow supply vessel *Aiviq*, left, and the tug *Alert*, right, tow the drilling unit *Kulluk* through rough seas southeast of Kodiak, Alaska. Response crews fought severe weather while working with the *Kulluk* and the *Aiviq*. U.S. Coast Guard photo by Petty Officer Jonathan Klingenberg.

as job fairs, high school visits, sponsorship and participation in community programs, and volunteer work.

Harkening back to our Crowley operations in Alaska, there are limited resources available for many who reside in remote locations of the state. That is especially true for training opportunities to work in the merchant marine. Crowley recently partnered with the Alaska Vocational Technical Center to win the Carl Perkins Post-Secondary Grant from the Alaska Department of Education and Early Development's Career and Technical Education Office. This three-year grant will help students develop skills to establish careers in the maritime industry.

These partnerships are critical, as most local hires in the maritime industry will come in at the entry level. Due to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers and other regulations, this avenue for career progression is getting more cumbersome and expensive. We expect this grant to help students with the costs of some of this training.

The Bottom Line

So how can a company create a successful local recruiting program? The first step is to decide whether or not it is of strategic importance. After that, it is important that the recruiting team align with the company's strategic objectives, which, truth be told, is already critical, regardless of the recruiting campaign.

Gallup provides the following three steps for helping recruiters get aligned:

- Help recruiters understand the broader business objectives and encourage them to take ownership for helping the organization accomplish its goals.
- Connect recruiting activities—including the process of defining what a great candidate looks like—to the outcomes that the organization cares about.
- Track, track, track. Gallup's experience suggests that people cannot consistently make good decisions based on their intuition alone—and that organizations cannot systematically improve their processes, procedures, or any other business aspects—without a data-driven approach.¹

While it's not always easy, successful recruitment, including a robust local hire program, can pay huge dividends. Crowley's successes are many, but the spirit of success was perhaps best exemplified on the tug *Alert* in the fall of 2013 while performing the emergency rescue tow of the drill rig *Kulluk*. *Alert's* crew was made up of several Alaska Natives, and the Alaska state legislature honored the full crew for superb performance in efforts to rescue the *Kulluk* as it went adrift off the southern point of Kodiak Island, noting:

"... although the Alert was operating in challenging sea conditions in a situation with an increasingly inevitable outcome, the calm and focused professionalism displayed by Capt. Layton and crew throughout the events, particularly in the last two hours, is highly commendable ...

*The crew safely and methodically adapted to changing conditions, used their training to identify and manage hazards, and then performed each task to minimize the risks associated with those hazards ..."*²

The professionalism, pride, and performance of our local hires have made Crowley what it is today.

About the author:

Mr. Ira Douglas is the director of marine personnel at Crowley, which employs more than 3,000 mariners. He holds a U.S. Coast Guard 2nd assistant engineer unlimited horsepower license and is a member of the Merchant Marine Personnel Advisory Committee.

Endnotes:

¹ "What Your Company's Recruitment Strategy is Missing," blog post by Brandon Rigoni and Bailey Nelson, found at www.gallup.com/opinion/gallup/185933/align-recruitment-business-strategy.aspx.

² Letter of commendation, 28th Alaska State Legislature.



The Future of Oil and Gas

Women and veterans are key to meeting the industry's workforce needs.

by Ms. TARA SMITH ANDERSON
 Director, External Mobilization
 American Petroleum Institute

Almost a dozen oil and natural gas companies made the top 500 when *Forbes* released its 2016 annual list of America's best employers, with Marathon Petroleum at the No. 1 spot.¹ In combination with a recent report from consulting firm IHS projecting up to 1.9 million new oil, natural gas, and petrochemical job opportunities by 2035,² the rankings indicate tremendous opportunity to begin a career in an industry that earns high marks from its employees and offers salaries \$50,000³ higher, on average, than those available in other U.S. industries.

Although the industry is facing a challenging environment now, keeping pace with American energy needs will require a substantial increase in the workforce long-term, in part due to demographic trends. The oil and natural gas industry is in the midst of a great crew change, during which 50 percent of the industry's employees are projected to retire within the next 10 years.

Further, of the potential 1.9 million direct job opportunities in the oil, natural gas, and petrochemical industries in the 2015–2035 timeframe, 707,000 are projected to be held by African-American and Hispanic workers.⁴

Women will hold a projected 290,000 jobs in the industry. That's an improvement over the current 237,000 jobs, but at just 16 percent of total industry employment, the number represents a major missed opportunity on both sides—for women seeking good-paying jobs, and for an industry expanding its workforce to meet future energy demand.⁵

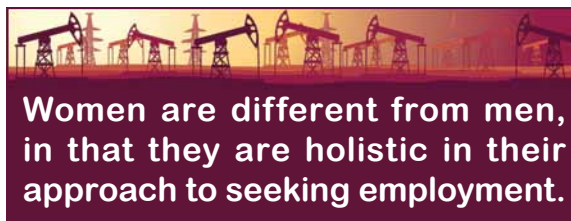
Where Are the Women?

When faced with this fact, my female colleagues and I were perplexed: We love our jobs and what we do, so why weren't more women interested in working in oil and gas? To learn more, the American Petroleum Institute (API) spent all of

2014 researching women's attitudes about employment in the oil and natural gas industry.

This extensive research included:

- in-person focus groups in six major cities, with groups broken down by racial and socioeconomic lines;
- national online focus groups of science, technology, engineering and mathematics (STEM) students, as well as under- and unemployed women;
- in-depth interviews with recruiters and academic advisors; and
- a national online survey of more than 1,200 women.



Women are different from men, in that they are holistic in their approach to seeking employment.

First and foremost, we learned that women are different from men, in that they are holistic in their approach to seeking employment. Salary matters to us, but not as much as other factors. In general, when it comes to employment, women want a job that allows us to learn and grow, a diverse and collaborative working environment, to be acknowledged and appreciated, to have steady work that challenges us, and to have flexibility.



Photo by Andresr/Shutterstock.com.



Veterans Energy Pipeline

The American Petroleum Institute has created the Veterans Energy Pipeline (www.veteransenergypipeline.com), an online tool that highlights the links between military occupations and the top oil and gas jobs.

On this website, a veteran can access information on a number of civilian careers in the energy industry that best match his or her military experience. The tool provides information on typical wages for these careers, whether the job has a bright outlook and is part of a “green economy” (as designated by the U.S. Department of Labor), and whether the job has an apprenticeship program.

In addition, the site lists those energy careers that match some or a few duties of a veteran’s military job and provides a job task comparison to give greater reference for those positions where a veteran may need additional training or experience.

they had no idea about the work in the industry. We jokingly say that women think you have to be a petroleum engineer or a land man to work in the industry. They don’t seem to make the connection that the oil and natural gas industry hires accountants, graphic artists, lawyers, occupational safety specialists, or any of the other numerous occupations that help run these businesses.



The oil and natural gas industry hires accountants, graphic artists, lawyers, occupational safety specialists, and other occupations.

The jobs in the oil and gas industry are diverse and plentiful, and many of these positions don’t require a Ph.D. — another misnomer of the industry. Many times, to qualify for these good, high-paying jobs, all you need is a high school education and to pass a drug screening test.

A Turning Point

A critical point in our research came when we provided the women in our focus groups a list of the diverse job opportunities within the industry, the education needed to attain these jobs, and a sample salary for each job. The results were astounding.

It seemed that for the first time, many of these women could imagine themselves working in oil and gas. One woman said, “I’m surprised. Like this one right here just says ‘high school education or equivalent,’ you know. I never would’ve thought that there would be jobs like that.”

In addition, as part of this research we asked the respondents what messaging would be helpful to encourage women to

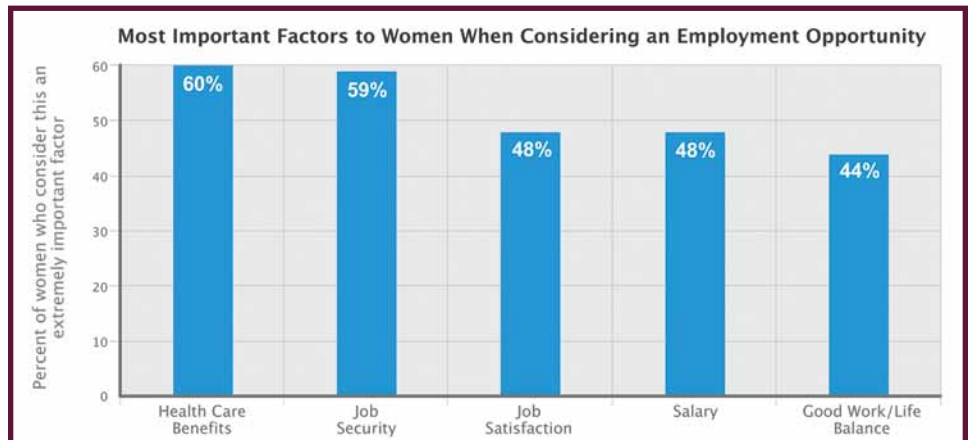
When we asked women about which employment factors mattered most to them:

- The most important item was health care benefits.
- A close second was job security.
- Salary tied job satisfaction for the third and fourth spots.
- A good work/life balance rounded out the top five.

As part of this research, API also studied women already working in the industry and learned that what women appreciated about their jobs were the very things that women outside the industry wanted in employment. The women working in oil and gas are passionate about the work they do, appreciate the good pay and flexibility, and like that the industry provides them with work environments that allow them to grow—all priorities for women who don’t work in oil and gas.

Not Just Engineers

Startlingly though, of the women polled in this research, only three percent had ever applied for work in the oil and natural gas industry. When asked why, 63 percent of respondents indicated that



Graphic courtesy of the American Petroleum Institute.

consider working in the oil and natural gas industry. The respondents recommended the following:

- Average industry pay is \$50,000 higher than the U.S. average.
- More than 228,000 women already work in the industry.
- The industry provides lifelong careers.
- The industry is looking for women for a range of job opportunities, including white-collar positions.
- The industry makes safety a top priority.

Highlighting Opportunities

Respondents also recommended that an educational campaign to highlight the sheer variety of jobs in the oil and gas industry would help encourage women to consider employment in this field. This would be amplified by hearing from other women who already work in the industry. Women and girls want to discuss employment with other women who look like them, talk like them, and come from similar backgrounds. This holds significant weight with women when choosing their employment field.



Heeding this recommendation, the American Petroleum Institute shared this research with women and girls across the country, to rave reviews. Throughout the past year and a half, API has met with a variety of women and girls—spanning from young professionals to college students to elementary school girls—to teach them about the oil and natural gas industry in hopes it will encourage them to consider

a career in the industry. We have found that the women and girls are excited about these job opportunities, many of which previously seemed out of reach due to misconceptions about work in the industry.

Veterans

Similarly, veterans also have misperceptions about employment in oil and gas, believing they are not qualified to work in the industry, but this couldn't be farther from the truth. Veterans come to the civilian workforce with extensive technical and nontechnical skills gained from their military experience, many of which have direct applicability to the industry. That's why API is also working with various veterans groups across the country—to share our research in hopes of recruiting more veterans into the oil and natural gas industry.

The oil and natural gas industry is at a critical juncture where it must carefully think about building its future workforce. A vast opportunity exists for the industry to attract, retain, and develop life-long careers for both women and veterans. With above-average salaries and an abundance of career opportunities projected over the next two decades, the oil and natural gas industry offers solutions to wage stagnation and income inequality, which remain major concerns in our still-struggling economy.

About the author:

Ms. Tara Smith Anderson brings more than 15 years of public affairs and state and federal government relations experience to her role as director of external mobilization at the American Petroleum Institute, where she directs the institute's mobilization campaigns on mission-critical issues.

Endnotes:

- ¹ *Forbes Magazine*, "America's Best Employers 2016," March 2016.
- ² IHS for API, "Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries, 2015–2035," March 2016.
- ³ American Viewpoint and Lake Research Partners for API, "Attitudes and Perceptions of Women About Seeking Employment in the Oil and Natural Gas Industry," January 2015. Reflects non-retail industry salaries.
- ⁴ IHS for API, "Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries, 2015–2035," March 2016.
- ⁵ *Ibid.*



Latent Talent

Use it or lose it.

by LCDR JEFFREY RUBINI
former Leadership and Diversity Advisory Council Chairman
U.S. Coast Guard 11th District

The post-millennial generation—those born after the year 2000—will enter the workforce in less than two years. They were born into a global war on terrorism, became fluent with mobile computing and social media as they entered their formative years, and witnessed the repeal of “don’t ask/don’t tell” and the U.S. Supreme Court case ruling in favor of same-sex marriage. They are perhaps the most diverse of all generations, and inclusion is simply a way of life for them. Speculation abounds over what the new leaders of tomorrow—the post-millennials—will want from an employer.

Looking Ahead

Many wonder if their work attitudes, beliefs, and values will align with their predecessor generation, the millennials, who are now mid- to senior-level managers and, in some cases, onto their seventh employer, according to the 2016 Deloitte Millennial Survey.¹ Post-millennials’ expectations of employers may not be very different from previous generations, including the most seasoned in the workforce, the “silent generation” who predated the baby boomers.

It seems that expectations for professional enrichment—mentoring, continuous personal development, a positive work climate, and more predictable opportunities for career advancement—never age. But however timeless, their implementation strategies do have a shelf life, and so they must be adapted to meet new realities, lest history repeat itself.

“Diversity is something that we can measure, whereas inclusion is the act of thinking beyond rank, rate, or race, and reaching out to others and including them in talks and actions—something not as easily measured.”

—Rear Admiral William Kelly
U.S. Coast Guard Assistant Commandant for
Human Resources

A Look Back

For example, history is replete with examples of businesses and militaries neglecting to invest in their workforce. Despite the professional and intellectual riches of talented leaders, future dividends failed to materialize because employees ascended without their predecessors’ wisdom and institutional knowledge, leading them to stagnate or simply quit.

“Having multiple mentors across your spectrum of work and life is critically important, but understand that some mentoring relationships will fail, others will reach different limits, while others will work longer term.”

—Rear Admiral William Kelly
U.S. Coast Guard Assistant Commandant for
Human Resources

The Coast Guard, too, must learn from the lessons of the past and adapt or replace old workforce strategies to meet new workforce requirements. We must focus on meaningful workforce investments that have a measurable outcome and are valued, regardless of generation. Fortunately, our tools may easily be adapted to the maritime industry’s practices, as we share a common goal of retaining people and developing their talents to meet mounting demands, global uncertainties, and complex 21st century realities.

The Coast Guard Human Capital Strategy

The Coast Guard made positive workforce investments through its first-ever Human Capital Strategy, signed in January 2016. The strategy defines human capital as our people and the latent or consciously expressed talents they bring to the Coast Guard, such as the knowledge from their own unique life and professional experiences, their capabilities and competencies, and their capacity to deepen existing skill sets and leadership, expanding them in new directions.

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The Eleventh District Leadership and Diversity Advisory Council

The Coast Guard's Eleventh District Leadership and Diversity Advisory Council (LDAC) designed and implemented a series of professional enrichment interventions, including mentoring and professional development events, a leadership speaker series, and an all-hands discussion forum about diversity and inclusion. The council also partnered with local chapters of the National Naval Officers Association, the Association of Naval Service Officers, and the Coast Guard Enlisted Association to deliver speed-mentoring and career development events, reaching nearly 170 junior enlisted and junior officers. Events featured a spread of proven Coast Guard leaders, including flag officers, commanding officers, officers in charge, senior enlisted leaders, and other talent from across the organization representing a variety of backgrounds and professional specialties.

Leadership Speakers

The leadership speaker series sought perspective from uniquely proven leaders on time-relevant issues, allowing for audience interaction.

For example:

- ◆ Jamie Hyneman, co-star of the Discovery Channel's show "Myth-busters," discussed building a culture of safety and exercising routine safety management processes in advance of experiments involving hazardous activities. ▶
- ◆ Professor Eugene Bardach, a world-renowned public policy academic, discussed port strikes and slowdowns in the context of the policy analytic process.
- ◆ T. Gary Rogers, a Fortune 500 CEO, discussed his personal observations on private sector leadership after serving for nearly 40 years as a chief executive officer. ▶
- ◆ A cyber security team from Lawrence Livermore National Laboratory discussed cyber vulnerabilities, security, and cyber detection and response technologies.
- ◆ Deputy Administrator of the Federal Emergency Management Administration, Joseph Nimmich (RADM, USCG, ret.), discussed

prolonged whole-community response to complex catastrophes.

- ◆ Janet Napolitano, former secretary of the U.S. Department of Homeland Security, discussed leadership amidst complex incidents, and how diversity and inclusion achieves mission excellence. ▼



Former Department of Homeland Security Secretary Janet Napolitano and Coast Guard Vice Admiral Charles Ray discuss leadership amid complexity, and how inclusive teams sustain mission excellence.



Master Chief Dawn Stephens, Mr. Jamie Hyneman, and Master Chief Aaron Zimmer. U.S. Coast Guard photos.

Diversity and Inclusion

As diversity and inclusion are central to the Commandant's guiding principle of duty to people, unleashing the potential energy of a diverse workforce to reveal its kinetic power first requires an environment of inclusion that enables integration at all levels of an organization and that transforms latent talent into something consciously expressed.

The LDAC advanced the Commandant's guiding principle, leading 10 diversity and inclusion workshops to present the Coast Guard's diversity and inclusion curriculum to 835 personnel. To broaden the curriculum's reach and to advance cultural change, the LDAC trained 37 facilitators through a customized three-day course.

SIX CHARACTERISTICS OF SUCCESSFUL LEADERS - T. GARY ROGERS

1. Enjoy Your One Trip Around the Track of Life
2. Hire Smart
3. Respect the Individual
4. Be a Persistent Optimist
5. Prepare to be "Lucky"
6. Relish the Struggle

T. Gary Rogers characterizes the successful leader.

Rear Admiral Bill Kelly, Assistant Commandant for Human Resources, says the strategy “provides a 10-year look beyond the tenure of a single Commandant, which is something our existing human resource programs don’t accommodate, and which fundamentally changed our human capital conversations from the near-term to something much farther out.”

The strategy is built upon a triad of meeting mission needs, service needs, and people needs. This last group focuses on valuing and supporting professional development for all Coast Guard military and civilian employees. To meet this set of needs, our human capital investment portfolio is hallmarked by two complementary initiatives, enabling the Coast Guard workforce to pursue personal development and meet expected career advancement milestones. Rear Admiral Kelly says that the two initiatives—our mentoring program and individual development plan program—are exploited as two of many “purposeful investments aligned with our core values and military, multi-mission, and maritime culture that produce the effects we want, which are to provide the right people, with the right competencies and experience, to the right place, at the right time.”

“When people apply themselves, sometimes they succeed, but many times they fail. And failure puts a person in a situation requiring an active response. The result is hard-earned experience, where real learning occurs. This is also where mentoring comes in—taking advantage of other’s experiences to inform and expand your perspective in ways you may not otherwise have known.”

—Mr. Jamie Hyneman, “Mythbusters”

The Coast Guard’s Mentoring Program

The Coast Guard established a formal mentoring program in 1991 amid a growing body of knowledge related to mentoring’s positive outcomes. As the original program evolved, mentoring was memorialized in 2004 as one of the Coast Guard’s 28 leadership competencies. Commandant Instruction 5350.24C of March 14, 2006, provided a timeless description of the mentoring program as an organizational strategy for increasing job satisfaction, professional development, and career advancement—fundamental prerequisites for employee retention.

That said, the Coast Guard provides a number of tools to enable entry to the mentoring environment and optimize its benefits. Web-based tools provide mentor training resources, and at one time included an e-mentoring system.

Other tools provide guidance on how to deliver unit-level mentoring activities such as sponsorship programs, first tour programs, and career and professional development events for our enlisted, officer, and civilian workforce. Unit-level mentoring activities can be immensely impactful. In the Coast Guard, maritime and cultural affinity groups as well as leadership and diversity advisory councils coordinate many of these activities.

“Supervisors have a responsibility to engage in mentoring discussions. Not only can supervisors help develop proficiency within their people, but they pass along mentoring as a part of the organizational culture.”

**—Rear Admiral William Kelly
U.S. Coast Guard Assistant Commandant for
Human Resources**

Coast Guard Leadership and Diversity Advisory Councils

Coast Guard leadership and diversity advisory councils (LDACs) were established formally through Commandant Instruction 5350.9 of December 13, 2011. Members of the LDAC represent the diversity of the unit and are selected personally by the command to locate and explore actual or perceived concerns about command and workplace climate, leadership development, and other issues surrounding diversity and inclusion.

The councils then design and implement command and organizational improvements based upon evidence derived from annual and biennial organizational surveys and input from unit members. Employees who wish to apply human resource entrepreneurship and innovation can optimize their capabilities with the LDACs. The benefits are mutual for employers and employees, as LDAC activities can enable the Coast Guard’s mentoring platforms to include supervisory mentoring. The investment supervisors make with employees during that process is tangible evidence of a path forward for them, providing an incentive for people to excel.

Career Planning

Many employees, regardless of generation, don’t plan out their career beyond a few years, but they do want to talk about their future. Whereas some companies actually encourage job-hopping and the “four-year career” to bring in a supply of fresh perspectives and diversity of experience, if an employer instead prefers retaining talent, then exploiting career planning discussions between supervisors and employees may enable greater retention. As Rear Admiral Kelly suggests, “It’s fool’s gold for us to recruit and not retain.”

Research suggests the majority of learning and development takes place on the job through challenging assignments complemented by supervisor feedback and mentoring. From the employee's perspective, the supervisor is central to his or her development. Analytics by Google's "People Ops" team shows that companies with supervisors who care about their employees, discuss their career progression, and support their development have better retention, sales growth, and productivity.²

The Coast Guard Individual Development Plan

The Coast Guard established a career planning program, including an individual development plan (IDP), with Commandant Instruction 5357.1A of February 2, 2006. The IDP is a tool Coast Guard employees use to think systematically about their current position, personal development, and future potential.

"It's easy to recognize and prepare for things you know are going to be problems. It's not so easy to prepare for things you don't know about. Having a mindset that includes curiosity and an inclination to seek out unexpected things that are potentially problematic is important. That's where mentorship is central. Having a mentor who can serve as a sort of crystal ball can help you prepare for those things that will bite you when they are least expected."

—Mr. Jamie Hyneman, "Mythbusters"

Employees, together with their supervisors, initiate the IDP upon reporting to their permanent unit and conduct the first counseling session within 30 days. During this period, they define the training and developmental experiences needed to achieve desired personal goals within a specified time frame, including formal education, promotion or advancement, professional credentialing, and improved career opportunities.

The individual development plan also facilitates integrating new personnel into the Coast Guard, as enlisted and junior officers are required to sustain an IDP within their first four years of Coast Guard service. Having a seasoned person reach out to new members to help them integrate by explaining both the written and unwritten features of a new culture is central to earning their loyalty and commitment in the organization.

It's Up to You

Despite the number of personal and professional development programs and activities an organization may provide, it's ultimately up to an employee to take charge of his or her career, making the most of offers for enrichment and advancement. My advice to newcomers in any industry is to welcome increased responsibilities, seek out volunteer and collateral duty assignments complementary to your professional goals, and immerse yourself in lifelong learning—do not sit idle.

To supervisors within our maritime profession: People may have no choice but to call you their boss, but people choose mentors. Measure your impact by how many people you command or supervise, and think hard about how many people call you their mentor. Reach out to your employees—especially those new to the maritime workforce—and help them to integrate and feel included. Discuss their strengths and areas for improvement, identify and prioritize developmental activities, help them to reconcile opportunity with competency, and prepare them for the future when you are no longer present.

People are—and always will be—your greatest resource. No matter how clever or sophisticated the technology, no matter how pervasive the imminent automation of tasks, no matter how eloquent the algorithms and analytics are at predicting or influencing change and decisions, people will always remain the common denominator for how (and how well) you achieve your objectives. Invest in your people to help guide them toward achieving and sustaining mission excellence while leading American prosperity and security into the future.

Author's acknowledgment:

I had the honor of speaking personally with Rear Admiral Kelly and Mr. Jamie Hyneman (a Coast Guard licensed mariner). Both shared their personal thoughts and experiences on leadership and mentoring to inform this article. I am sincerely grateful for their time, insights, and conversation.

About the author:

LCDR Jeffrey Rubini is assigned to marine industry training under the Office of Marine Environmental Response Policy. His one-year fellowship includes collaborations with the Delaware Bay and River Cooperative, Gallagher Marine Systems, American Petroleum Institute, Philadelphia Energy Solutions, and Sunoco Logistics. He chaired the 11th District LDAC during his previous assignment as 11th District Response Advisory Team supervisor and Marine Environmental Response program manager.

Endnotes:

- ¹ Deloitte, 2016, The 2016 Deloitte Millennial Survey: Winning Over the Next Generation of Leaders, found at www.deloitte.com/MillennialSurvey.
- ² David A. Garvin, Alison Berkley Wagonfeld, and Liz Kind, 2013, *Harvard Business Review*, "Google's Project Oxygen: Do Managers Matter?"

Maritime and Marine Science Schools

Training America's next generation of mariners.

by DR. ARTHUR H. SULZER, ED.D.

Captain, U.S. Navy, retired

*Maritime for Primary and Secondary Education Coalition Advisory Board
Maritime Academy Charter School Philadelphia Founding Board Member*

I have been pleased to see a recent re-emergence of primary and secondary maritime and marine science education in the nation. This is actually the third period in our country's history when public educators have embraced maritime education. The first time was in 1874, when the City of New York opened the New York Nautical School aboard the Navy sloop *St. Mary's* and 17 intrepid lads, aged 14 to 17, trooped aboard. This early school matured to become SUNY Maritime College.

The second resurgence of maritime education began in 1936 when the New York Board of Trade opened the Metropolitan Vocational High School for Boys to fill a growing need for unlicensed seaman. In 1946, this school moved aboard the former liberty ship *John W. Brown* and remained in operation until 1985, eventually graduating more than 5,500 students.¹

The third resurgence of maritime education began around the year 2000 and sprang up in several locations around the country. This resurgence, which continues today, has a much different focus than its predecessors, which were designed to produce seamen and officers to go to sea after graduation. Present-day high school maritime curricula and marine science and transportation/logistics programs are used to create student interest in staying in high school, developing their academics, and in considering post-graduation maritime marine science education, where they will actually receive the more advanced certified training for a maritime career.

Why Marine Science and Transportation?

The students of the 21st century are similar to those of past centuries, but differ from them in important ways. For example, today's students are visual learners and absorb material in short bursts, while previous generations were content to sit through a lecture to learn material. In the past, maritime education was hands-on — students learned to set a sail, operate a winch, or take a celestial navigation fix. These actions, while still necessary, have become much more advanced through the use of technology.

Further, the focus on maritime and marine science professions can address some of the major issues educators have identified that can plague public education, such as students not graduating high school and a lack of interest in science, technology, engineering, and mathematics (STEM) education and technical careers. Those in the maritime industry hope this focus can re-invigorate its ranks, too, as the industry



Students use a marine simulator at the Bayfront Maritime Center in Erie, Pennsylvania. All photos courtesy of the author.

struggles with the shortage of a qualified technical workforce.

How These Programs Work

Our forefathers discussed establishing a national education system at the primary and secondary/post-secondary level that we see in much of the world. They discarded this idea in favor of the “little red schoolhouse” approach (local education), which is based on the premise that education tends to work best when the local taxpayers who fund the majority of school costs design and manage their programs. This remains true, so long as these programs conform to all national laws and state education requirements.

Similarly, things tend to work best in the neighborhood, too, with maritime and marine science programs. When local stakeholders support these programs, they can work in any section of the country. This allows a school district to design a program that best fits its own students, taxpayers, and local industry. The program can design its style to fit the needs of the community, region, or a specific company or industry. Individual programs can be designed to follow a career, technical, apprentice, or academic model that will allow students to select the program that best fits their needs.

Marine or Maritime?

Today’s programs may be offered in primary schools and high schools. The major difference between the two is in the manner of presentation and the outcome objective. There are also differences between “marine” or “maritime” education. Marine-focused education typically refers to those subjects and professions related to the science of the sea—such as marine biology, oceanography, or ecology. The term “maritime” refers to the practical side of the industry, including sailing, ship repair, fishing terminal operations, or marine engineering.

The classroom structure of a primary school single classroom with a primary teacher and a fairly regulated curriculum lends itself to what I call the “Song of the Sea,” where maritime subjects are infused into traditional subjects. As an example, when discussing fractions or degrees in a math class, a ship’s compass may be used to illustrate a practical example of navigation. Likewise, the mathematics of a right triangle is the basis of a plane sailing solution.

Many schools have a maritime instructor on staff, just like a music or art teacher, and students attend these “special” classes once a week for enrichment. Given the fact that many of these are urban students with little exposure to the sea, these classes can build an interest in the science of the sea, profession of the sea, and STEM education.

The majority of these types of schools have marine/maritime programs at the high school level, since the structure of high school allows students the opportunity to select maritime/marine courses as electives to complement their required classes. However, several high schools are expanding their curriculum into the primary grades, which affords a greater opportunity to shape a student’s academic outcome. Research shows that building interest in STEM needs to begin in primary school.

The programs vary greatly: from a school with a single course designed to provide awareness of career and educational opportunities, to schools with several career tracks with multiple courses, and finally, to apprentice programs with industry partners that offer U.S. Coast Guard certifications and employment upon graduation.

Roles for Government and Industry

The maritime and marine science schools have done their part over the last several years in developing curriculum, engaging students, advancing student academic proficiency, and creating an interest for post-secondary maritime education and careers. The government and industry can help advance these students to post-secondary education and employment by sponsoring conferences. For example, in 2001, the U.S. Maritime Administration helped to raise awareness of a mariner shortfall with a conference held at the U.S. Merchant Marine Academy entitled “Creating an Action Plan for Recruiting and Retaining American Mariners.” One of the suggestions that came out of the conference was creating maritime high schools.²

The Ship Operations Cooperative Program (SOCP) sponsored the follow-on conference in 2008 that introduced the

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STEM

The good jobs of the future at sea and ashore are connected to science, technology, engineering, and mathematics—often referred to as “STEM.”
Maritime applications include:

- **studying ocean currents (science),**
- **automated engine rooms (technology),**
- **alternative fuel-powered propulsion plants (engineering), and**
- **navigation (mathematics).**



MARITIME/MARINE SCIENCE SCHOOLS OVERVIEW

The Veterans and the New Recruits

Veterans

- The Maritime Academy Charter School (Grades K–12), Philadelphia, Pennsylvania
- The Urban Assembly New York Harbor School (Grades 9–12), Governor’s Island, New York
- The Bayfront Maritime Center (Grades K–12), Erie, Pennsylvania

The Maritime Academy Charter School, Philadelphia, Pennsylvania



Students learning line throwing to a barge.

students in some rented college classrooms. The school is now entering its 13th year and has graduated five classes. In 2013, the school added a second campus and was approved to expand to a full K–12 school.

Presently, there are more than 800 students enrolled. The middle school is rated in the top 20th percentile of Philadelphia middle schools; a large portion of its graduates are accepted to elite city high schools. It recently added career tracks in marine science and transportation logistics to the original maritime studies program.

The school also offers a traditional high school curriculum. Students may switch between tracks after they take the “Introduction to Maritime and Marine Science Studies, Education and Careers” course in ninth grade.

The school partners with several of the port’s maritime organizations and the Independence Seaport Museum to offer summer maritime experiences, including sailing aboard the tall ship *Niagara* and attending maritime STEM and leadership camps. Additional information at www.maritimecharter.org.

One of the original high schools that heralded the maritime education movement in the 21st century, the Maritime Academy Charter opened its doors in 2003 with 128 fifth- and sixth-grade



Students learn about boat handling at the Maritime Academy Charter school in Philadelphia, Pennsylvania.



Students at the Maritime Academy Charter School in Philadelphia, Pennsylvania, pilot the launch *Delaware River*.

The Urban Assembly New York Harbor School, Governors Island, New York

One of the first maritime high schools, this is now in its 13th year as a career and technical education (CTE) high school. It falls under the New York City Department of Education. Originally located in the heart of Brooklyn, in 2010 the school moved to the site of the former U.S. Coast Guard base on Governors Island in the center of New York Harbor. The city oversaw a \$34 million renovation of a former U.S. Coast Guard facility for the academic building, and the Harbor Foundation that supports the school recently completed a \$5 million capital campaign for the school’s new marine affairs science and technology center.

Additionally, the school recently received formal approval for its six CTE programs from the state Department of Education. Students now graduate with an industry-approved technical credential in fields such as:

- aquaculture,
- marine biology research,
- marine systems technology,
- ocean engineering,
- professional diving, and
- vessel operations.

To support these CTE programs, the school and the Harbor Foundation developed partnerships with the local maritime community, including the South Street Seaport Museum, SUNY Maritime College, and local maritime operators such as McAlister Towing and New York Water Taxi. The school also offers a sail training program aboard the South Street Seaport Museum’s schooner *Lettie G. Howard*.



Wood shop students at the New York Harbor School.

In April 2014, the Harbor Foundation, in partnership with the Harbor School, launched the Billion Oyster Project, aimed at restoring one billion live oysters to New York Harbor by 2035, and, in the process, engaged thousands of students in their local marine ecosystem. Further, the city has plans in the works to open two maritime middle schools (to be located on the Staten Island and Brooklyn waterfronts) that will serve as feeder schools over the coming years. Additional information on the school is available at www.newyorkharborschool.org or www.bop.nyc.

The Bayfront Maritime Center, Erie, Pennsylvania

Entering its 18th year, this community-based, nonprofit center moved into a new waterfront facility in 2004. What better location to work with maritime community partners? In 2011, the Bayfront Maritime Center (BMC) developed a partnership with Erie's public schools to provide an alternative education program for students in grades 9 through 12 having difficulty succeeding in a traditional school setting.

In addition, the BMC runs a summer credit recovery program for students to complete courses needed to graduate. The center's after-school program, Project SAIL, helps students prepare for employment through boat building and sail training by building



Students build a boat at the Bayfront Maritime Center in Erie, Pennsylvania.

self-confidence and learning about teamwork. Additionally, the Bayfront Maritime Center recently acquired an unfinished hull that will be developed into a representation of the 1812 schooner *Porcupine*—one of the vessels in the Battle of Lake Erie. The schooner is being built to USCG standards and will allow the center to take more students on extended sail training opportunities. The center is also working with the Veterans Administration to develop maritime employment pathways. To learn more about this unique maritime community organization, visit www.bayfrontcenter.org.



The Tall Ship *Niagara* docked in front of the Toledo Maritime Academy before a summer cruise.



Bayfront Maritime Center students learn to sail on Lake Erie.

New Recruits

- The Maritime Academy of Toledo (Grades 5–12), Toledo, Ohio
- Stephen F. Austin and Kirk Lewis Career & Technical High Schools (Grades 9–12), Port of Houston, Texas
- Blake and Jefferson High Schools (Grades 9–12), Tampa, Florida

The Maritime Academy of Toledo, Toledo, Ohio

This school is located on the banks of the Maumee River in the Port of Toledo. From a small beginning in 2007 with 32 students in a rented apartment, it has grown to over 275 students. The founder recognized early on the importance of partnering with the maritime industry, port organizations, and maritime academia.

The school broke ground by being the first in the nation to have state-approved maritime career technical education (CTE) programs in maritime occupations and maritime culinary arts programs. The school has developed a long-term relationship with several Great Lakes steamship companies, including Interlake Steamship Company, which has hired entry-level graduates.

Additionally, several graduates have been admitted to the Great Lakes Maritime Academy in Traverse City, Michigan. In 2010, the school moved to its new location, the former American Maritime Officers Great Lakes Training Center. This state-of-the-art facility comes with a pool and a marine simulator that the academy uses to offer USCG-approved professional mariner training courses. The school is the first in the nation to have a student USCG Auxiliary detachment and to utilize modified college versions of USCG Auxiliary courses.



Students on the school boat *Mariner* collect marine samples from the Maumee River.

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MARITIME/MARINE SCIENCE SCHOOLS OVERVIEW

The Veterans and the New Recruits (*continued*)



Students from the Maritime Academy of Toledo cruise on the Tall Ship *Niagara*.

Students in the maritime program are job-ready upon graduation, complete with a transportation workers identification credential, merchant mariner credential, and passport. The school is adding a three-year marine environmental CTE program this fall, which will be the first such program in the Midwest. Additional information about the school and its programs may be found at www.maritime-academy.us.

Stephen F. Austin High School and Kirk Lewis Career and Technical High School, Port of Houston, Texas

Stephen F. Austin High School is the largest of the four high schools in the Houston area school district that offers a maritime-based curriculum. Austin boasts 700 students enrolled in four main maritime pathways:

- piloting and deck operations,
- maritime logistics,
- naval engineering and design, and
- maritime systems engineering.

Further, a program in ship building and repair will soon be added. Austin also offers maritime IT systems, maritime human relations, and business, all designed to interest students in exploring related



Students in the Maritime Academy of Toledo's wood shop build a boat.

careers in business, computers, telecommunications, transportation, and engineering.

The Stephen F. Austin High School and Kirk Lewis Career and Technical High School each have marine simulators to introduce students to the basics of ship handling, weather and bridge management, and team management. Additionally, the Kirk Lewis Career and Technical High School has state-of-the-art facilities to practice practical seamanship on its pond.

Both high schools have built a strong partnership with San Jacinto Community College, which recently opened a \$26 million maritime campus on the Houston Ship Channel. This facility offers USCG-certified courses to high school students as well as a two-year associate degree in maritime transportation with mariner credentials.

The high schools and community college also have a strong working relationship with the maritime community through the Port of Houston Authority and the Houston Pilots Association, funding internships and program guidance. The totally integrated maritime education program in the Port of Houston is unique in the country. Additional information on these schools can be found at www.houstonisd.org/austinhs, www.cthsweb.com, and www.sanjac.edu.

Blake and Jefferson High Schools, Tampa, Florida

This is a unique program, in that two high schools in the same city — Blake and Jefferson — partner on maritime/marine science programs. Approved programs are eligible for state funding, and, as a result, Florida has the largest number of maritime K–12 schools in the nation. The program in Tampa started in 2011 and currently has 200 students between the two schools.

The International Propeller Club of Tampa has been a long-time partner and has connected the school with industry partners such as International Ship Repair and the port authority, providing summer internships. Additional information on Blake High School is available at www.blake.mysdhc.org.

maritime industry to the concept of maritime K–12 education. More than 150 individuals from industry, academia, and the government attended to hear from representatives from the first six maritime and marine schools in the country.

In 2015, the State University of New York Maritime College and North American Marine Environmental Protection Association sponsored the “Securing Maritime’s 21st

Century Workforce” conference to connect marine employers and post-secondary academic institutions with the now 56 maritime K–12 schools around the country and their cadre of graduating students.

Building on this model, the SOCP has developed the course “Introduction to Maritime & Marine Science Studies Education and Careers,” which covers all aspects of the industry and educational requirements for various positions. Written

by maritime/marine high school teachers and industry professionals, the course is 170 hours long, divided into 19 individual modules, and is suitable for grades 8–12.³

Outcome

The proliferation of these schools—from six to more than 50 schools in programs around the country—demonstrates their success. Further, the physical facility investment and development at schools in New York, Toledo, Houston, and Philadelphia, to name a few, as well as increased enrollment at individual schools, clearly shows that parent and student interest in maritime and marine studies has increased.⁴

While all of these are positive, visible signs of program interest and growth, we still needed to evaluate student academic success. In 2012, a three-year case study, “Maritime Tactile Education for Urban Secondary Education Students,” was completed at the University of Pennsylvania Graduate School of Education. This study of two urban maritime/marine high schools (located in Toledo and Philadelphia) in a six-way case comparison with similar public and charter schools in the cities examined a number of questions:

- Why do students enroll and stay enrolled in a maritime high school?
- How do the demographic characteristics of students who enroll compare with characteristics of those students attending local high schools?
- How does attending a maritime high school affect outcomes in terms of student attitude, attendance, academic achievement, benchmark scores, graduation, and marine/maritime post-secondary education and career awareness?
- How do these schools address developing student character/personality characteristics, and what challenges do these schools face in developing their programs?

Overall, the study findings suggested that attending these schools made a difference for students in terms of school attendance, academic engagement, grade and test score improvement, and graduation rates.⁵ In recent years, more students have been attending maritime post-secondary academic and apprentice programs as well as directly entering the industry. These maritime/marine programs may provide one pathway for urban high schools to afford students the opportunity for academic achievement and a rewarding career.

The Future

As far as the marine/maritime schools are concerned, we have seen mixed results. Many of the inner city schools have graduation rates in the 90th percentile range, while other

schools in their city languish at graduation rates below 60 percent.⁶

We’ve come a long way, but we don’t want to fail our youth at this point. It is time for the government, industry, and institutions of higher academic learning to step up to the plate and bring these young people—our future workforce—to fulfilling careers. I encourage maritime industry leaders to find a K–12 maritime/marine/transportation school in your city or area and connect with them by offering financial support, internships, scholarships, mentoring, and employment.

About the author:

Dr. Arthur H. Sulzer, a graduate of SUNY Maritime College, is an actively sailing mariner and a professional surveyor and consultant in the Port of Philadelphia. He holds a USCG master’s unlimited ocean license and third assistant engineer’s unlimited horsepower license. He completed 30 years of active and reserve service with the U.S. Navy and retired at the rank of captain. He holds several advanced degrees, an M.S. in transportation from SUNY Maritime College, an MBA in finance from Hofstra University, and an Ed.D. in higher education from the University of Pennsylvania. In 2012, he was appointed by former President Obama to the Saint Lawrence Seaway Development Corporation Advisory Board.

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For more information:

The Maritime for Primary and Secondary Education Coalition is made up of individuals, schools, industry members, and academics with an interest in promoting maritime K–12 education. The coalition sponsors conferences, shares best practices, and connects organizations and individuals. Visit the website at www.mpsecoalition.org.

The Ship Operations Cooperative Program is a nonprofit organization of maritime industry professionals who promote beneficial innovations in ship and other maritime operations. Get more information at the website: www.socp.us.



The MITAGS Maritime Apprenticeship Program

An alternative pathway to deck officer.

by Ms. MARJA VAN PIETERSOM

*Business Development, Maritime Apprenticeship Programs
Maritime Institute of Technology and Graduate Studies-Pacific Maritime Institute*

For centuries, merchant mariners have learned their trade through apprenticeships — gaining knowledge from hands-on experiences, on-the-job training, and following their superior’s lead. In this way, the “old salts” passed on knowledge acquired over a lifetime to mariners making their way up the hawsepipe.

The Pacific Marine Towing Industry Partners

Ten years ago, the Maritime Institute of Technology and Graduate Studies-Pacific Maritime Institute (MITAGS-PMI) and a handful of organizations came together to discuss how to attract and retain the next generation of qualified mariners. At the time, the median age of towboat officers was around 55, and the industry was concerned about an imminent shortage of credentialed deck officers as well as the potential loss of “historic knowledge.” The organizations formed the Pacific Marine Towing Industry Partners (PMTIP) to take action to address the issue, then created the two-year workboat academy deck program.

PMTIP eventually evolved into a skills panel tasked to assess future mariner requirements. For example, the group completed an operating plan in 2010 with a focus on marine engineering, as it became clear that the engine department faced the same concerns as the deck department. Today, the group is gearing up to build a marine engineering apprenticeship program with Seattle Community College via a U.S. Department of Labor American Apprenticeship Innovation Grant.

MITAGS-PMI Maritime Apprenticeship Program

Although the traditional “hawsepipe” route is still available, it is very difficult to obtain an original endorsement following that path, so the MITAGS-PMI maritime apprenticeship program provides the mariner an alternative pathway to deck officer. While the state maritime academies continue to produce highly competent deck officers, this route may not necessarily be a fit for all who seek to become credentialed merchant mariners.

Candidates in our program tend to be in their mid-20s to early 30s who have either worked a job and/or gone to college. Many have families and house payments, and so are very motivated to get the

“The apprenticeship relationship between the cadet and partner company allows both parties to get to know each other and grow together. The program schedule is excellent and the order of classes is logical. I went straight from license prep to sit for my license; two days after getting my license I was sailing as a full-time employee.”

—Cameron Northrop
2012 Workboat Academy graduate

The workboat mate program won the Department of Labor’s Registered Apprenticeship Innovator and Trailblazer Award in 2012 and received the Training Award for North America from Lloyd’s List in 2015.

training aboard a vessel and in the classroom. They know that the 28-month program will be demanding, but they are ready for the challenge, as they look forward to the rewards of the credential and a decent paycheck.

continued on page 48

The Program

MITAGS-PMI's maritime apprenticeship program attracts applicants of all ages as well as varied educational and cultural backgrounds. They include high school graduates, veterans, college grads, and thirty-somethings who dream of making a big change and shipping out.



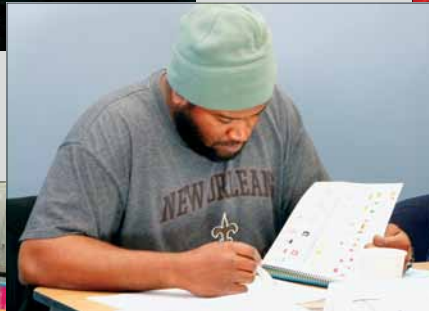
Retention report. All photos courtesy of MITAGS-PMI.



▲ Morning watch in the simulator.



▲ Weekly exam.



▲ Daily quiz.



▲ Navigation training.



▲ Linethrowing.

◀ Working with the Global Maritime Distress and Safety System.

The Right Fit

So how does the maritime apprenticeship program differ from obtaining a credential through one of the state academies? First, our candidates go through a rigorous screening process with the partner company as well as MITAGS-PMI to ensure the right fit. Once matched, apprentices spend all their sea time (360 days) with one partner company. This allows the company to train the apprentice from the deck plates up, instilling company values, mission, and vision from the first day an apprentice steps aboard.

The candidates are screened for self-motivation and understand that they are enrolling in an adult education program. They recognize, as the saying goes, that they get as much out of their education as they put into it, and that ultimately their success is up to them and how hard they want to push to complete the program.

Additionally, following short academic phases of 4–6 weeks with 2–3 month sea phases provides a complementary mix of academic training and hands-on experience. This is effective for the apprentice as well as for the company.

Finally, as a capstone to the program, the apprentices must successfully complete the Navigation Skills Assessment Program. Each session uses realistic scenario-based exercises geared toward the company's operations, and qualified subject matter experts assess results. The ultimate goal is to reduce the occurrence of maritime incidents by ensuring mariner competency.

Today, MITAGS-PMI is in a fortunate position whereby apprentices often find us, primarily through word of mouth or internet searches. We also travel to military transition assistance program centers to educate servicemen and servicewomen on opportunities in the maritime industry.

**“Having an effective apprenticeship program is one of the keys to developing a high-performance organization. Providing a prospective employee and their colleagues an environment in which they can learn together allows the individual to assimilate the company’s culture and enter the job market with skills-based knowledge and experience. It helps to build better employees all the way around. And it is not only the apprentice—the mentors, supervisors, and other workers learn and grow when participating in these programs.” —Christopher Peterson
Director of Operations at Crowley Petroleum**

Veterans have been very successful in the program and are often a natural fit—their background in the military has prepared them well for life at sea, as they understand being away from home, following a chain of command, and living in small quarters. In our Baltimore program, approximately 50 percent of our apprentices are veterans.

We are also fortunate in that our partner companies (which have been involved with the program since 2005) continue their involvement with the school and the program through yearly program advisory committee meetings. Many suggestions

originating in these meetings have been implemented in the program, which re-invigorates the program, allowing it to continue to provide some of the most qualified mariners to the industry.

About the author:

Ms. Marja van Pietersom joined MITAGS-PMI in 2005 after 20 years in various facets of the maritime industry. Ms. van Pietersom holds an unlimited chief mate oceans and sailed deep sea and near coastal on tugboats, freighters, and cruise ships. Under her guidance, the maritime apprenticeship program has grown to include three coasts and 45 partner companies.

For more information:

Statistics courtesy of the Maritime Institute of Technology and Graduate Studies-Pacific Maritime Institute. See the website at <http://mitags-pmi.org>.

Learning Through Simulation

Maritime simulation from an educator's perspective.

by Ms. MARIE H. HUHNKE
Director, STCW/Licensing
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It's dark on the bridge. The watchstanders there talk quietly to each other, discussing arrival procedures and traffic. Through the windows, they see the lights of other ships intermingled with the distant lights from shore. The relative quiet of the bridge is occasionally interrupted by the radio, the phone, or an alarm bell.

When seas build, as whitecaps form, the mate on watch reaches out instinctively

for the handrail. A light drizzle starts; the shore lights are no longer visible. It's a typical night at sea.

Then, suddenly, the lights come up and the images in the windows fade to nothing. This "bridge" is actually a simulator located in a building on *terra firma*, and these watchstanders are cadets due at their next class right after the simulation debrief.

Simulation is the most significant and innovative advancement in maritime training to date. Maritime training and education professionals use simulation to train and assess mariners on a variety of technical skills, such as navigation, rules of the road, and ship handling. It is also widely held to be the most effective method of teaching non-technical skills like information processing, situational awareness, decision making, judgment, leadership, teamwork, communication, multitasking, and stress and fatigue management.

Simulator training offers other advantages, as well. For example, students can repeat exercises that they find challenging, the feedback is immediate, and students can experiment, participating in scenarios that are above their skill level or too risky for the "real" world.

Simulation comes in a variety of forms, and maritime colleges like Massachusetts Maritime Academy host a full spectrum of simulators, ranging from lower-fidelity simulators like radar or an electronic chart display and information system, which are set up as stand-alone booths, to high-fidelity full-mission bridge simulators. These realistic ship's bridge mock-ups are equipped with 230 to 360 degrees of surrounding projection screen, so students can view a

high-fidelity representation of almost any port in the world from their perch on the bridge.

Learning Through Simulation

In the simulator, students learn in two major modalities: either through problem-based learning or by collaborative learning. Problem-based learning focuses on problem-solving and decision-making, and encompasses real-world situations, cognitive processes, complexity issues, and technical skill competency. Collaborative learning emphasizes the social and behavioral aspects of learning and incorporates social/behavioral theories, cognitive processes, teamwork, and shared mental models.

In a team setting like bridge team watchstanding, students learn through both models simultaneously, so simulation is the ideal setting where real-world scenarios can be played out quite realistically and without risk, bringing maritime training and education closer to its goal of reduced human error and safer seas.

Can We Improve Simulation?

Acknowledging how complex scenarios can become, researchers maintain that the first priority is identifying



Learning Modalities

Problem-Based Learning

Problem-based learning (PBL) is small group learning that concentrates on knowledge acquisition and developing peripheral skills. For example, instructors present students with a complex, real-world problem to solve, requiring students to apply knowledge gained from several fields or areas of study.

As the name implies, this learning process focuses the student on thinking critically, analyzing, and using previously acquired knowledge to solve problems. Researchers tend to believe that the shared mental model is important to solving problems.

However, in any team situation, there are bound to be times when there is more than one solution or one perspective. Problem-based learning studies do not focus on the process of winnowing solutions and perspectives to settle on a team course of action or decision, as there are many more peripheral skills that can be achieved through PBL, including adaptability to change, dealing with problems, and encouraging self-reflection.

Collaborative Learning

Collaborative learning also takes place in small groups, with an emphasis on how students interact with each other to build a shared mental model of the problem and how their learning increases as a result of working together. Collaborative learning is based in social/behavioral theory. Some of the most valuable observations of collaborative dynamics include the effects of gender in collaborative learning, the importance of humanizing the technologically complex and stressful work environment, and the stages that learners progress through as they acquire leadership skills.

These findings make a difference when considering the incredible diversity of merchant crews, as each crewmember's story is affected by ethnicity, culture, life experience, and position in the chain of command. Humanizing the maritime workplace is especially important because crewmembers are deprived of their familiar support systems, working most often with people who are essentially strangers, possibly from different cultures and ethnicities, and working in a physically demanding environment.

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specific and narrow learning outcomes, then the specific competencies to be assessed.

Consider, for example, this description of a layered, challenging simulator exercise:

Exercise is set in the approaches to the [Bosporus Straights], Turkey ... The vessel will proceed to an anchorage for bunkering.

There will be a number of vessels in the concerned area (anchored, approaching, overtaking, and numerous ferries crossing). The strong tide setting [the vessel] will make it hard to steer.

Exercise will continue until the vessel is alongside a jetty ... A number of southbound vessels, strong cross currents, and ferry operations will require strict adherence to and monitoring of the passage plan as well as collision avoidance maneuvers.

The exercise will require effective teamwork, situation awareness, leadership, and decision-making skills.¹

In this scenario, as with others designed for high-fidelity simulation, problem complexity is the focus. In contrast, another team of researchers designed an exercise that reduced complexity and narrowed and controlled learning.² The scenario is one in which deck officers find themselves every day: A vessel begins to exhibit the effects of a cross current, and is pushed off-track. While this may seem to be a very simple exercise, it tests complex skills.

For example, the officer on watch must monitor the initial course and notice that they are being pushed off-track. Then the officer must compensate for the current by altering course enough to return to the original track line, monitor the return to the track line, and change course again to maintain the proper track line.

By limiting the problem to a vessel drifting off course, collecting assessment data doesn't overwhelm the scenario. The student can also gain an important sense of how many potential error opportunities exist, even in such a routine task.

Simulation should be structured to take advantage of iterative learning and immediate feedback. There should also be opportunities within the scenario for guided teamwork practice, and practitioners should develop ways to measure student success that remove subjectivity by using

measurement tools and standardizing performance observations. Finally, researchers recommend linking feedback to learning outcomes during the simulation debrief session.

Using Simulation to Assess Performance

Assessment—determining whether or not a student has met the learning objectives of a simulation evolution—is a key objective of simulation training, but is essentially different from teaching and learning. Student performance during a complex problem or scenario is extremely arduous to assess. Any author who has conducted such a research project notes how difficult this can be, as well as how much of the research effort went into developing the assessment definitions, measures, and instruments.

Often, researchers need more than one type of assessment instrument to sufficiently gather all assessment data to assess multifaceted scenarios; problem complexity introduces so many layers of learning that using only one assessment tool is often too reductionist. It would seem obvious to embed data collection into the simulation. Interestingly, simulation computers do collect numerical data such as track-lines and distance-off-intended-track, but they cannot apply qualitative methods to assess performance.

Continuing Discussions

Even though the maritime industry has been using simulator training for decades, there are still many opportunities to discuss the merits, uses, potential, and pitfalls of simulation. For example, simulators are expensive to install and maintain. A new installation of a full mission simulator can cost upwards of \$3 million, including investment in the simulator and personnel. Instructors and technicians have different areas of expertise, and both require continuing education and equipment training. Hardware and software also need to be regularly maintained and updated, and often supporting systems (such as climate control and electrical load) need to be updated to handle the new computer systems.

One way to take advantage of simulation without the high cost of full mission facilities is to utilize low-fidelity simulation. Though popular opinion is that high-fidelity simulation is superior, there is a growing body of evidence demonstrating that high-fidelity simulation does not necessarily lead to better skills transference. These studies distinguish between engineering fidelity, or how realistic the training environment is, and psychological fidelity, which is when the task and mental processes closely approximate the real-world experience. These researchers further believe that complex

training aids may not be appropriate for novice learners who are focusing on basic skills.

Because full mission simulation is used to teach ship handling with a variety of ship models (many of which are proprietary) and in different locations, many maritime studies focus on the engineering fidelity, especially with respect to the accuracy of ship modeling in simulation.

Regardless of where we stand in the discussion on simulation training and assessment, there is no denying its potential as well as our potential as constantly improving watchstanders as a result of learning via simulation.

About the author:

Ms. Huhnke is a member of the academic division at Massachusetts Maritime Academy. She holds degrees in marine transportation and anthropology and is currently a doctoral candidate at Northeastern University. Her research interests include the application of cultural theory to bridge resource management, the differences between teaching teenagers and adults as applied to college-aged students, and entrepreneurship in education.

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The Modern Marine Simulator

Assuring deck officer competence.

by CAPTAIN SCOTT CRAIG
Director of Marine Development and Compliance
Crowley Maritime Corporation

Crowley Maritime Corporation has engaged in a marine simulation program over the last five years to assure the competence of its deck officers. The simulator assessments take into account regulatory and industry standards, industry best practices, and lessons learned through the company's continuous improvement program.

Training Versus Assessment

Crowley has long used marine simulation for training purposes and to complete International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) assessments. The next step has been to use modern marine simulators to determine if the mariner has combined individual STCW skills to be an effective watchstander.

The modern simulator is ideal for this measurement, as it allows us to present situations that could lead to serious marine incidents in a safe, objective, repeatable format. In this effort, we define specific assessment points in an exercise that measures the officer's reactions to specific challenges. For example, the assessment points measure skills such as bridge resource management, applying International Regulations for Preventing Collisions at Sea (COLREGS), situational awareness, piloting, navigation, communications, compliance with standing orders, prioritization, and multi-tasking. We also use experienced masters to set the parameters of an effective response and employ extensive mariner beta testing to verify the scoring over a range of mariner responses.

The Assessment

Our assessment features a 40-minute segment of a voyage in near-coastal waters. It is an active watch that contains normal watchstanding challenges such as vessel traffic, currents, course changes, reduced visibility, and radio communication with other parties. We intentionally avoided a "nightmare" watch where unusual incidents occur.

The watch period is followed by a 20-minute debriefing discussion where we let the officer describe his or her thought process and decisions. This review helps the assessor

differentiate between a simple mistake and a fundamental lack of knowledge. It also serves to decompress the officer who often already realizes a mistake made and can hardly wait to express the correct action. This often leads to a positive learning experience with no further retraining required.

Conversely, when the debrief discussion uncovers a fundamental lack of knowledge or skill gap, the assessor can explore the possible reasons for the deficiency. Retraining may then vary, based on whether a skill was never learned or simply was not demonstrated because it wasn't a part of the officer's normal practice.

The assessor places officers who demonstrate serious skill gaps in a "needs further review" category. This allows for a more thorough evaluation of the assessment audio/visual recording as well as the individual's performance history. A panel including our full assessment team, the individual's port captain, and labor relations personnel conduct this review and assign retraining.

Our company does not own a simulator, but instead uses the facilities of our strategic union partner schools, including the Maritime Institute of Technology and Graduate Studies in Baltimore, Maryland; the Pacific Maritime Institute in Seattle, Washington; the Simulation, Training, Assessment, and Research Center in Dania Beach, Florida; and the Harry Lundberg School at Piney Point, Maryland.

We do maintain two senior masters on staff who perform the assessments along with the simulation staff. Using masters who can conduct an assessment and the following debrief in a positive, non-threatening manner consistent with the company's values is critical. If it is unfeasible to use internal staff, a company may choose to use masters in an established assessment program, such as the MITAGS Navigation Skills Assessment Program.[®]

The Challenges

One challenge an assessment program faces is the necessity to address the identified skill deficiencies in a cost-effective

manner. Many times, when officers are unable to successfully complete an assessment, we observe out-of-date knowledge—for example, the ability to maneuver in conformance with COLREGS.

All officers must pass a U.S. Coast Guard COLREGS examination at the 90 percent level at some point in their careers. However, officers may not have opened the book since 1987, when the endorsement renewal COLREGS examinations ended for mariners able to demonstrate a year of sea service within the preceding five years. We have encountered senior officers who still quote the older requirement for speed in restricted visibility. Therefore, the corrective action can be straightforward: Review the COLREGS and follow with a COLREGS test.

Navigational skills such as parallel indexing can be assigned via worksheets completed onboard during their next embarkation, which the master can then verify. We have also partnered with our associated schools to present shorter courses in watchstanding to address more general watchstanding concerns.

An immediate policy consideration a company must consider is whether to allow an officer demonstrating a serious skill gap leading to a (simulated) collision or grounding to return to sea. Our concept, in such a case, is that the officer must complete retraining and demonstrate those skills prior to the next embarkation. The latter is accomplished through successful completion of a similar but different assessment.

While mariners sometimes challenge simulation, saying that it doesn't mimic the "real" conditions aboard their vessels, we have found that mariners react to the simulator challenges using the same practices, they admit, that they regularly use onboard. Even when the discussions during simulator orientation cover a point of assessment such as responsibilities in reduced visibility, mariners will often revert to their comfort zone when placed under pressure.

The Successes

Our experience has confirmed that marine simulation can confirm our deck officers' watchstanding skills. The objective is to close skill deficiencies without removing employees, since marine operating companies commit too many years and dollars to develop a deck officer to lose his or her services. Fortunately, our experience has been that less than 1 percent of the officers assessed could not successfully complete the program after retraining and reassessment.

Analyzing assessment program data has allowed our company to focus training resources where they are most

needed. For instance, early program data showed an overreliance on a single source of navigation information—often the electronic chart display and information system (ECDIS). This led us to emphasize active radar navigation in our ongoing bridge resource management refresher programs. This principle requires the mariner to continually crosscheck the GPS-based systems with radar fixes when in the near-coastal environment. We also focused on having deck officers complete the formal ECDIS training years before the STCW gap-closing initiative required it, based on this data.

After completing more than 1,000 assessments, we have detected no significant difference in performance based on where a deck officer was originally trained (academy, hawsepipe, military, or professional schools). However, watchstanding skills can degrade over time. Officers who are placed in non-watchstanding roles such as tanker cargo chief mate or on reserve operating status government prepositioned ships do show significant decline in skills after two years in a non-watchstanding role. This degradation shows up in their ability to multitask and maintain situational awareness under pressure.

In the Hiring Process

Additionally, the same simulator assessment program can be used to screen applicant deck officers in a cost-effective manner. It may behoove a company to perform a one-day assessment that provides a snapshot of the officer's skills rather than paying for the officer to join the vessel to observe performance. Our experience has identified that up to 17 percent of applicants do not meet skills standards.

That, of course, is just the first hurdle. While an officer's watchstanding skills can be verified by simulation, onboard assessment is still required to verify the skills are being employed on board and that individual officers are integrating their skills into effective bridge teams.

However your company employs it, the modern marine simulator is an effective management tool that provides information to manage and motivate deck officers. The simulators provide a unique environment in which to verify deck officers have the full range of skills necessary to be effective watchstanders, and through which the operating company can reduce the risk of serious marine incidents.

About the author:

Captain Scott Craig is the director of marine development and compliance with Crowley Maritime Corporation. He is responsible for recruiting, training, and providing career development for the mariners on the company's U.S.-flagged vessels, as well as documenting the mariner's compliance with regulatory, industry, and customer requirements. He served 24 years in the Crowley fleet, including experience as master of ship assist and escort tugs.



The Regulator's Perspective on Future Training

Finding the balance between risk abatement and burden to the mariner.

by MR. JAMES D. CAVO
*Office of Merchant Mariner Credentialing
U.S. Coast Guard*

Changes and advancement in technology are facts of life for the mariner, so merchant mariners who are appropriately educated and trained on the advanced systems of today's vessels are vital. However, mariners now spend a substantial amount of time training for their endorsements, and adding more and more new course requirements may not be the optimal solution. Instead, we may need new, out-of-the-box ideas on providing education and training.

Why new technology? Perhaps the most common incentive for vessel owners and operators to adapt to new technologies is economics—at least initially. New technology may provide more efficient, economical, and/or safer ways to operate a vessel. This is often the case with emerging technologies.

Similarly, there may be undesirable economic consequences for not installing or implementing new technology. Vessels that don't adapt to new technologies may operate less efficiently, take longer to complete a voyage, incur greater operating expenses, or have a greater exposure to potential liability. The risk and/or cost of not adapting may be substantially greater than that associated with the new technology. An oft-cited example is a case involving the loss of a tug and its tow in a storm.¹ The tug was not equipped with a radio capable of receiving weather forecasts that might have warned of the approaching storm, and was found liable for the loss on grounds of unseaworthiness.

Unfortunately, introducing a new technology can also result in undesirable consequences. For example, significant changes in vessel equipment and working practices resulting from new technology carry the risk that mariners unfamiliar with the new equipment or operational practices may misuse the technology. Accordingly, perhaps the greatest challenge associated with new and evolving technology is not installing new equipment on vessels, but rather ensuring that it's used properly and safely.



A civilian mariner checks his vessel's electronic chart display and information system. U.S. Navy photo by Mass Communication Specialist Seaman Desmond Parks.

The Only Thing Constant is Change

Today's mariner has seen near-constant changes in shipboard technology and operations. For instance, deck officers who began their seagoing careers in the late 1970s have seen the introduction of automatic radar plotting aids; introduction and discontinuance of the Loran-C navigation system; first-generation satellite navigation; Global Positioning Systems; and implementation of the Global Maritime Distress

and Safety System, electronic chart display information systems, dynamic positioning, and a host of other technological changes.

Many of these advances have profoundly changed the way in which mariners stand their watches and perform their daily duties. Failure to understand and effectively use the equipment and systems may have adverse results, and in the aftermath of a casualty involving the misuse of, or failure to adapt to, new technology, regulatory bodies may compel requirements intended to ensure technology is used safely and properly.

Radar-Assisted Collision

For instance, introducing marine radar on ships in the middle of the 20th century brought with it what became known as a “radar-assisted collision” resulting from the improper use of the equipment.² The collision between the passenger vessels *Stockholm* and *Andrea Doria* in 1956 was an early and high-profile casualty in which improper use of radar was cited as a contributing factor.³

Following such casualties, the Coast Guard added a requirement for formal training for mariners serving on vessels that are required to be fitted with radar.⁴ Following more recent casualties, this requirement for radar training was expanded to include periodic refresher training to maintain an endorsement as radar observer and for the requirement to apply to more mariners and vessels.⁵

Responding to Immediate Needs

Though mariners are now required to obtain training on much of the equipment they will use on their vessels, a regulatory solution may not be the most expedient response to an imminent need. Regulations take time to develop and publish, and while regulation may be a necessary and desirable long-term solution, the need for training may be immediate.

In such cases, regulatory bodies may issue guidance and non-mandatory recommendations for training as an interim remedy while regulations are developed, as was the case following the 1979 collision of the SS *Exxon Chester* and the M/V *Regal Sword*. Following this casualty, the National Transportation Safety Board recommended that masters of vessels fitted with automatic radar plotting aid (ARPA) capability receive formal training in its use before assignment to the vessel.⁶

Although the Coast Guard did not publish regulations requiring formal training for ARPA until 1997, it became common for mariners serving on vessels with ARPA to complete formal training in its use prior to assignment to the vessel.⁷ More recently, the Coast Guard published guidance that includes recommendations for training for vessels



A U.S. Coast Guard buoy tender assisted in the SAR operation after the *Andrea Doria* and *Stockholm* collided in 1956. U.S. Coast Guard photo by PHC Lougher.

using natural gas as fuel and for mariners serving on vessels operating in polar waters.⁸

Another way to integrate new technology without regulatory intervention is through private, non-governmental programs, such as is being done currently for vessels equipped with dynamic positioning (DP) systems. Although the Coast Guard has not published regulations for certification of mariners who serve on DP vessels, the industry uses certification regimes. While the Coast Guard does not mandate that mariners be certified under these systems, many vessel owners and their clients do require it. So, in the absence of Coast Guard regulations, these systems provide some assurance that mariners have been trained in the use of the DP system aboard their vessel.

Future Challenges

There is little doubt that technological change will continue—perhaps more rapidly, and in greater abundance. However, in recent years there has been a tremendous increase in the amount of training mariners are required to complete. The training for some officer endorsements has been compared to putting 10 lbs. of flour into a five-pound bag. There are tangible financial and time commitments associated with the training that must be considered before adding to this burden.

In addition to finding the right balance between risk abatement and burden to the mariner, it is important that the training is effective for each student. If the training a mariner receives does not recognize and address each mariner’s individual needs, little benefit will result.

Traditionally, training for new shipboard equipment has focused on what has been described as “knobology,” focusing on the various functions of the equipment. The

shortcomings of this approach are apparent, considering the stereotypical complaint of many a seasoned captain that new mates often immerse themselves in the radar or ARPA and never look out the window.

Considering the burden of more and more training to the mariner, and the shortcomings of training that focuses on a single piece of equipment, it may be that better training is required—not simply more training. To this end, the Coast Guard is receptive to, and will consider, a variety of training methods other than traditional training ashore, and will approve such training if it is effective in achieving the intended standards of competence.⁹

About the author:

Mr. James Cavo has worked for the Coast Guard in mariner credentialing since 1997 and is currently with the Office of Merchant Mariner Credentialing at Coast Guard headquarters. Prior to employment with the Coast Guard, he worked for nine years as a deck officer on oil tankers, and for five years as a maritime attorney. He has a B.S. in meteorology from the State University of New York Maritime College, an M.S. in maritime management from Maine Maritime Academy, and a J.D. from the New England School of Law.

Endnotes:

- ¹ 60 F.2d 737 (1932), 1932 A.M.C. 1169.
- ² See e.g. Thomas F. McGovern, "Head to Head with Radar," *Proceedings of the Merchant Marine Council*, October 1957, p. 155.
- ³ Robert J. Meurn, *Watchstanding Guide for the Merchant Officer*, 2nd ed., Cornell Maritime Press, Centreville, MD, 2008.
- ⁴ "Council Proposes Regulations for Radar Observers," *Proceedings of the Merchant Marine Council*, September 1957, p. 141. The training requirement is currently found in 46 CFR 11.480.
- ⁵ Since 1982, mariners have been required to complete refresher training every five years to maintain the validity of a radar observer endorsement (*Federal Register* Vol. 47, Page 40800, September 16, 1982). The requirement to hold a valid radar observer endorsement was expanded to include deck officers on towing vessels following the allision of the towing vessel *Mauvilla* with a railroad bridge crossing Big Bayou Canot, Alabama, in September 1993. This requirement is now in Title 46 Code of Federal Regulations (CFR) Section 15.815(c).
- ⁶ National Transportation Safety Board, "Marine Accident Report: Collision of United States Tankship *SS Exxon Chester* and Liberian Freighter *M/V Regal Sword* in the Atlantic Ocean Near Cape Cod, Massachusetts, June 18, 1979." (NTSB-MAR-80-11).
- ⁷ *Federal Register* Vol. 62, Page 34506, June 16, 1997.
- ⁸ CG-OES Policy Letter 01-15, *Guidelines for Liquefied Natural Gas Fuel Transfer Operations and Training of Personnel On Vessels Using Natural Gas as Fuel*. CG-OES Policy Letter 01-16, *Guidelines for Training of Personnel on Ships Subject to the International Code for Ships Operating In Polar Waters*.
- ⁹ 46 CFR 11.301(a).



A Post-Service Career

Military to mariner gives veterans a new way to serve.

by CONGRESSMAN DUNCAN HUNTER
*Chairman of the Subcommittee on Coast Guard and Maritime Transportation
 U.S. House of Representatives*

Leaving military service can be difficult for servicemen and servicewomen. This separation is compounded by the stress of trying to find some meaningful way to make a living out of uniform. It is unfortunate that veterans sometimes find their active duty skills don't translate into fulfilling civilian jobs.

Military mariners, however, can be exceptions, as military sailors receive exhaustive training that meets many of the requirements for a merchant mariner license. Unfortunately, administrative roadblocks sometimes prevent military training and qualification from translating directly into a merchant mariner credential.

The Transition

Veterans detaching from the military want to reintegrate into their communities. I am continually seeking opportunities to make this happen, and transition assistance leading to quality job opportunities is a significant first step. In the case of the seagoing services, a post-service career in the civilian maritime community could be meaningful while also contributing to national security.

Very much like the situation airline pilots are facing, in the next decade, the maritime industry expects significant losses of its most experienced mariners due to retirement. Because we rely on U.S. merchant mariners for our defense sealift capability, trained and experienced military sailors will be key assets in safeguarding our national defense needs. With many of the top-level mariners advancing quickly to retirement age, we must ensure our country continues to be able

to ship military cargo overseas. The U.S. has a robust and capable pool of military mariners that could fill the impending gap in the U.S. maritime community.



Chairman Hunter (at the microphone) and Ranking Member John Garamendi (pictured third from the left) participate in a Coast Guard oversight hearing. Photo courtesy of the U.S. House of Representatives, Committee on Transportation and Infrastructure.

M2M

The Maritime Administration's Military to Mariner (M2M) program was created to address the needs of detaching service members seeking a post-service career. It is designed to take advantage of the training military mariners already receive, and the program provides education and opportunities for military mariners to acquire merchant mariner credentials while on active duty.



From left to right, U.S. Coast Guard Commandant Admiral Paul F. Zukunft is accompanied by Master Chief Steven W. Cantrell; Administrator Paul N. Jaenichen, Sr., Maritime Administration; and Chairman Mario Cordero, Federal Maritime Commission; as they testify at the Fiscal Year 2017 Budget Request hearing before the Subcommittee on Coast Guard and Maritime Transportation. Photo courtesy of the U.S. House of Representatives, Committee on Transportation and Infrastructure.



Congressman Hunter dons an exposure suit during a visit to Coast Guard Station Cape Disappointment. U.S. Coast Guard photo.

In March of 2016, the Subcommittee on Coast Guard and Maritime Transportation brought together leaders from the Department of Defense, U.S. Navy, U.S. Coast Guard, and U.S. Maritime Administration along with stakeholders from the maritime industry and the Merchant Maritime Personnel Advisory Committee to discuss ways to ease the transition of mariners from military to civilian jobs.

Working Together

What became apparent was that we needed a coordinated effort in the armed services to enable the forward progress of the M2M program. By that September, positive changes to the program were

already apparent, as several Navy “A” and “C” schools were approved to provide credit toward a credential. The subcommittee plans to continue oversight, and will work with the armed services, industry, and the Merchant Maritime Personnel Advisory Committee to ensure further progress.

Further, the Howard Coble Coast Guard and Maritime Transportation Act of 2014 amended sea time requirements for service members to extend the period of qualifying sea service from the previous three years to the previous seven years. This small change significantly increased the number of military mariners qualified to apply for a merchant mariner credential.

I will continue to work on legislation to allow military sailors to use military active duty training toward obtaining civilian credentials. I will also continue to press for sea-going services to evaluate programs that could become eligible for credit. The renewed efforts of the Department of Defense, Navy, and Coast Guard are already yielding notable progress toward these goals. We must continue to clear the path for our servicemen and servicewomen—not create more obstacles that hurt them and the civilian maritime industry.



Congressman Hunter visits Maritime Safety & Security Team San Diego to learn more about Coast Guard maritime security forces and their response capabilities. U.S. Coast Guard photo.

About the author:

In 2008, Duncan D. Hunter was elected to the U.S. House of Representatives, succeeding his father, Duncan L. Hunter. He serves California’s 50th Congressional District. Following the attacks on September 11, 2001, Congressman Hunter joined the U.S. Marine Corps. He served three combat tours overseas and obtained the rank of major. Congressman Hunter was the first Marine combat veteran of the wars in Iraq and Afghanistan elected to Congress.

Social Justice, Military Credentialing, and the American Experience

Mapping a route to post-military employment.

by COMMAND MASTER CHIEF EDWARD LEWIS
Fourteenth District
U.S. Coast Guard

Sit back and visualize the people and businesses from your hometown. Now try to identify, based on local impact, the top three businesses or industries. Think of the overall result if the most impactful companies were reduced in size or eliminated altogether. How long would it take until the regional economy failed? How many top businesses could move out of a community before the economy imploded?

What if we were talking about a community's talent pool? Would the same repercussions occur, if, say, three percent of a young population—all in the top 30 percent of income level—left for a period of six to eight years? Even worse, what if your most promising future breadwinners started their careers, only to find out their occupation forced them into a lower social and economic standing?

Why do we pay such close attention to the stock market and so little to the talent pool? Families depend on our national labor force, much like the companies above, to provide economic, social, and cultural stability.

This is the situation faced by the enlisted workforce.

The Military Enlisted Workforce

The Department of Defense is the country's largest training organization and recruits approximately 265,000 entry-level people per year.¹ The entire workforce faces the same selection criteria (including drug use, felonies, body fat composition, mental or physical aptitude, character flaws, age), regardless of chosen profession, and, according to Army statistics, more than 70 percent of America's youth do not even qualify for military service.²

Some communities have far fewer qualified applicants, based on the criteria above. Drawing recruits from low-income communities can be especially challenging, as the military competes with academic programs for a small pool of qualified candidates.

Further, military downsizing has a double impact on unlicensed and uncertified service members (veterans who do not hold a U.S. Coast Guard-issued merchant mariner credential, or MMC). In addition to increasing unemployment through forced separations, these young workers typically find fewer open positions. Unfortunately, even though these highly motivated workers have successfully held military positions, they become newly unqualified and



Frank DiGiovanni (right), Director of Training Readiness and Strategy, Office of the Deputy Assistant Secretary of Defense, discusses civilian credentialing with Keith Boring (pictured with his back to the camera), program manager for Navy Credentialing Opportunities On-line (COOL). U.S. Navy photo by Carla M. McCarthy.

Translating Military Experience

It is important to note that increasing position grades require experience commensurate with increasing responsibilities. That means you can earn your credential on active duty, complete another sea tour, and upgrade the credential or endorsement. Waiting until transition could significantly limit the credential level.

Navigating the military training system offers another challenge. Consider how the soldier, sailor, marine, airman, and Coast Guardsman's knowledge, attitude, ability, and skill are developed. There are three basic delivery methods for instruction:

- ▶ military occupational specialty tasks required for advancement, which is typically restricted to core skills;
- ▶ resident training for specific skills, tied to positional responsibilities;
- ▶ structured on-the-job training such as unit qualifications.

Advancement requirements are the only tasks accepted for military occupational specialty assessments, since they are the only tasks that each member must attain.

The Department of Defense Credentialing Opportunities On-Line (COOL) websites help enlisted members find information on certifications and licenses related to their military occupational specialties.

suffer increased competition as they compete in a lethargic economy.³

Fortunately, the Department of Defense recognizes the value of military credentialing programs—programs that enable members of the armed forces to obtain professional credentials related to military training and skills acquired during service, helping them translate that experience into civilian occupations by mapping enlisted specialties with commensurate certifications and licenses. The Department of Defense has also created a military to mariner program to offer more post-military employment opportunities.

Military to Mariner

The military to mariner initiative serves two purposes. First, it addresses veteran employment and resiliency, as unlicensed, uncertified people are overrepresented in the unemployed community, and veterans make up 33 percent of the national unemployed population. This can lead to a downward spiral; unfortunately, statistically 22 veterans commit suicide every day.⁴ The bottom line is: People with a certification or license have a lower unemployment rate than those without credentials (2.7 percent as compared to 6.1 percent).⁵

Secondly, the military to mariner initiative supports America's maritime resiliency. We are a seagoing nation that is dependent upon a thriving maritime-based economy. Thus, the U.S.-flagged merchant fleet and U.S. merchant mariners are national assets that support our economy as well as those of our partner nations.

Unfortunately, the U.S. Maritime Administration estimates that we have barely enough qualified mariners to crew the U.S.-flagged vessels that sustain our armed forces.⁶ The challenge to crew Military Sealift Command vessels will increase when the new International Convention on Standards for Training, Certification and Watchkeeping for Seafarers (STCW) are implemented.

Good News and Challenges

Fortunately ex-Navy, -Army, and -Coast Guard members are prime resources to fill the gap. Additionally, most of the highest-paid mariner posts require merchant mariner credentials (MMCs), which, among other requirements, are tied to sea time. This can give the ex-military an advantage.

The challenge is demonstrating that a military member's experience and training meet the standards required for a merchant mariner credential. If the military record is incomplete or doesn't show adequate position responsibilities, the credential evaluator will not be able to authorize as wide a range of endorsements as would be possible with a complete record.

Another stumbling block to external credentialing occurs when a performance assessment ignores a known certification or license. Although the military utilizes external credentials for civilian hires, they do not use the same standards for military workforce development.

Future Focus

The military has a moral obligation to ensure that veterans returning to their communities are prepared for the

transition into the civilian sector. Credentialing programs help to enable a smooth transition into the civilian sector and make a positive impact on veteran families. We recruited the best and brightest our country had to offer—now let's ensure they are recognized as professionals, and that they transition into a better social standing than the one from which they entered.

About the author:

Master Chief Edward Lewis is the advisor to the Coast Guard District 14 commander. Previous assignments include the machinery technician Rating Force Master Chief Station Destin, Florida; the USCGC Midgett; USCGC Point Doran; Station Galveston, Texas; USCGC Point Spencer; USCGC

Manowar; Chief Petty Officer's Academy; Coast Guard Academy; Sector Guam; and the Chief Petty Officer's Academy.

Endnotes:

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2. Department of the Army, 2010, *Blacks in the U.S. Army; Then and now*. Washington, DC: Government Printing Office. Retrieved from www.armyg1.army.mil/hr/docs/demographics/MRA_booklet_10-ARMY.pdf.
3. N. Stacey, C.L. Anderson, and others, *Military cutbacks and the expanding role of education*, 1992. Washington, D.C., Office of Research, Office of Educational Research and Improvement, U.S. Dept. of Education.
4. VA, 2012. Suicide data report: 2012.
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6. USNI, MARAD: Certifying More Mariners to Serve in Sealift Surge a "Top Priority," 2016.



For more information:

Find more information on military credentialing and veteran employment at the Joint Credentialing Opportunities On-Line (COOL) websites. The Navy credentialing online program, for example, recently added the Blueprint to Mariner to assist with military transitions. See www.cool.navy.mil/usn/otr/otr-blueprint.htm.

More information is available at:

<https://www.cool.army.mil/>

www.cool.navy.mil/

<https://www.uscg.mil/retiree/resources/transition.asp>



A Maritime Career

Partnering with industry to assist veterans.

by Ms. BERIT ERIKSSON
Workforce Development Director
Sailors' Union of the Pacific's Andrew Furuseth School of Seamanship

Ms. ZOE GOSS
Director, Marine Development
Crowley Maritime Corporation

The U.S. Maritime Administration (MARAD) estimates that the maritime industry will need an additional 74,000 licensed and unlicensed mariners over the next 10 years, which may create maritime national security workforce shortages, especially in terms of sustaining national strategic sealift capability.¹ In short, this is a national security issue.

Although the maritime academies will graduate 9,000 officers over the next 10 years,² two-thirds of the crew on sealift and merchant vessels are entry-level mariners—positions maritime academy graduates don't fill.

The Transition

The military to mariner program (M2M) is an industry-wide initiative that hopes to address issues associated with workforce gaps by making it easier for military service members who plan to transition to the private sector to obtain merchant mariner credentials.

The initiative involves evaluating military education, training, and assessments for equivalencies meeting the provisions of the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), 1978, as amended, as well as national mariner certifications required to obtain a merchant mariner credential. The initiative is not without its challenges, as many military qualifications do not meet the majority of these requirements. This is particularly true among the military unlicensed ratings trying to obtain their third mate/engineer endorsements.

So, at present, many Navy, Army, and Coast Guard members with appropriate sea service experience can only obtain

an entry-level merchant mariner credential (MMC), even though they have service records verifying that they have the required sea service and training for a higher endorsement. This means they have to take classes and spend time and money after separation from the service to acquire the credential the U.S. Coast Guard determines their sea service qualifies them for. This can create challenges and hardships for many veterans who wish to enter the civilian maritime industry at the level they were qualified for in the service.

The Crosswalk

Fortunately, the Merchant Personnel Advisory Committee (MERPAC) agreed to work on this initiative. The MERPAC group is working on ways to identify the equivalences of various qualifications/competencies as well as ways to assist service members with their application process. The MERPAC group has been working on this issue for over 15 years.³ The initiative really took off when three Coast Guard master chief petty officers and several staff members from the Army Transportation School joined the effort, lending their expertise, dedication, and insight.

This effort has many parts (identifying the equivalences, identifying the gaps, obtaining course/programs approval, etc.) that must be completed before veterans can get their credential, but most essentially, the foundation of the whole process is identifying the equivalences. This requires creating a “crosswalk” between military qualifications and civilian competency requirements. Under the auspices of MERPAC, a group of industry experts (from training institutions, various industry sectors, and mariners) comes together with military training personnel to develop each crosswalk. To date, the joint effort has led to the development of 57 crosswalks for the Army, Navy, and Coast Guard.

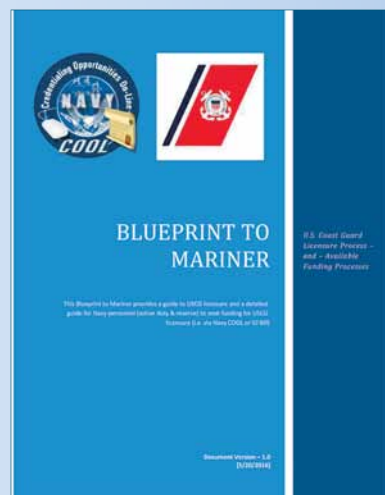
Guidance

The Blueprint to Mariner guide contains detailed information regarding Coast Guard licensure, including veteran funding options. Contents include:

- the Navy COOL four-step process,
- the NMC six-step process,
- the TWIC five-step process,
- the MMD seven-step process.

Download it from www.cool.navy.mil/usn/pubs/blueprint2mariner.pdf.

Find Coast Guard National Maritime Center military service requirements at www.uscg.mil/nmc/professional_qualifications/default.asp?tab=1#TabbedPanels1.



When the crosswalk is complete, the identified military qualifications will be used to package the course/program for submission to the Coast Guard National Maritime Center (NMC) for approval. One of the additional benefits of this process is that the industry representatives have shared their experience with the military agencies to facilitate the approval of the courses/programs.

Currently, the Coast Guard and Navy have numerous course approval requests pending evaluation for NMC approval. Of course there may be gaps where there are no equivalent military qualifications for a credential that the service person is applying for, but they would be able to fill this gap at a maritime training school.

Credentialing Specialist

MERPAC has also recommended that the Navy and Coast Guard identify credentialing specialists who can assist military personnel in compiling the documentation and records required for a merchant mariner credential application. The model for this is provided by the credentialing specialists at the Army Transportation School at Ft. Eustis, Va.

For example, a credentialing specialist could assist in:

- identifying military rating, designators, and occupation specialties that are equivalent to the deck and engine endorsements;
- requesting sea service records to verify sea time and qualifications;
- determining which military training has been approved as equivalent through cross-walked course approvals;

continued on page 64

Military to Mariner in Practice

One example of the challenges involved in acquiring a merchant mariner credential (MMC) that has endorsements equivalent to military qualifications is reflected in the case of Jordan Kareklas. He sailed as a bosun mate with the U.S. Navy for six years and used the GI bill to attend a local maritime school after his separation from the Navy.

The GI Bill

He was able to get his able seaman endorsement on his MMC and started with Crowley Maritime on the Puerto Rico services. He has since transferred to the Crowley Petroleum articulated tug and barge service, where he is working toward his tankerman PIC endorsement.

However, once a service member accesses GI bill benefits, these benefits must be used within a certain period of time. Because of this, military members are reluctant to use their GI bill benefits for maritime training.

On the Job Guidance

Another example is Sean Brooks, who sailed as a U.S. Navy submarine officer for six years. Crowley Marine recruiters met him at a veterans' industry expo. He obtained a basic ordinary seaman endorsement on his own, but did not have the required basic safety training course.

He experienced other struggles and frustrations, as he had taken electronic chart display and information system, radar, and other relevant courses through the Navy that were not transferable.

Crowley guided him on how to properly complete the application process for the deck utility rating, then hired him as a utility for the trailer bridge service. He now works as a deck utility for Crowley Puerto Rico Services.



Federal Agencies Caucus to Support M2M

by Ms. HELEN BROHL
Executive Director

U.S. Committee on the Marine Transportation System

The United States has a continuing need for qualified mariners to crew U.S. flag ships that meet with our national security and international commerce demands. Looking for ways to address that need, the U.S. Committee on the Marine Transportation System (CMTS) initiated a federal interagency “Military to Mariner (or M2M) Forum” in September 2014. Co-led by the Maritime Administration (MARAD) and the Military Sealift Command (MSC), the purpose of the forum is to discuss and address the challenges faced by sea-service veterans in obtaining the training and credit necessary to provide qualifying evidence in support of earning a U.S. Coast Guard-issued merchant mariner credential (MMC).

Other forum participants include the U.S. Army, U.S. Navy, U.S. Coast Guard, Veteran’s Administration, Offices of the Secretary of Defense and Transportation, Department of Labor (DOL), and the Transportation Security Administration. In addition, federal agencies who directly hire or who depend on qualified mariners for their missions, such as the MSC, National Oceanic and Atmospheric Administration, and U.S. Army Corps of Engineers, participate to discuss the challenges experienced when recruiting and retaining qualified mariners.

Working from a military to mariner challenges and opportunities matrix, the forum reports that a great deal of progress is being made within the agencies to support veteran transition, including:

- continued efforts to crosswalk Coast Guard ship-board training and qualifications to mariner credential requirements,

- permanent staff assigned to the Navy Credentialing Opportunities On-Line (COOL) project,
- greater alignment of ratings to other programs,
- U.S. Coast Guard Academy graduates getting the opportunity to receive a 100 Ton Master-Near Coastal credential,
- joint Navy-Coast Guard effort to issue the “Blueprint for Mariners” report crosswalk for submitting watch qualifications,
- growth of service training courses approved for merchant mariner credentials, and
- development (by Department of Labor Northwest Division) of instructional videos for finding ship-board employment with federal agencies.

The CMTS M2M forum supports the Veterans Employment Initiative (VEI) under Executive Order 13518. At a recent meeting, it was noted that between downsizing our military and the challenge of attracting younger generations to this industry, we’re starting to see evidence of an emerging shortage of skilled mariners. Bringing the men and women in uniform who have bravely served our country into the maritime industry isn’t just the right thing to do — it’s also a smart business decision.

About the author:

Ms. Brohl is the first CMTS director, appointed in 2006. The M2M Forum is one of a number of interagency initiatives supporting the marine transportation system. For more information, visit the CMTS website at www.CMTS.gov.

- identifying gaps where military training does not fully meet the standards;
- identifying educational organizations common to all branches of the military (or within an individual military service) that already assess military education for STCW and national certifications;

- identifying military academy and service school curricula that meet STCW and national certifications; and
- navigating Department of Defense credentialing opportunities websites.

Recent Momentum

The U.S. domestic maritime industry has held multiple M2M events throughout the country since 2013, including career fairs connecting veterans and active military with maritime industry representatives.

On March 1, 2016, leadership from the U.S. Maritime Administration, Coast Guard, MERPAC, Navy, Military Sealift Command, industry, and congressional staffers met to discuss the challenges veterans face to obtain an MMC and to identify job opportunities in the maritime industry.⁴

This panel explored:

- the current shortage of qualified mariners,
- the difficulty for surface warfare officers to get credit for military service and training toward obtaining an MMC,
- how to bridge the gaps in training between military and maritime experience,
- whether there is a need to modify course curricula, and
- the overall significance and need to employ our transitioning veterans.

Congress has focused on this issue for some time, and, as a result, scheduled a follow-on listening session on September 22, 2016.⁵ At this listening session, representatives from the Department of Defense, Navy, Coast Guard, MARAD, MERPAC, and industry stakeholders discussed ways to improve coordination among stakeholders and simplify the process for veterans to obtain their MMCs while on active duty or when they leave service. Stakeholders also focused on how documentation—including sea time and applicable training—could be maintained in a manner that alleviates delays in obtaining an MMC.

Rep. Duncan Hunter, chair of the House Coast Guard and Transportation Subcommittee, made several requests from those attending, including requesting that the Navy provide the appropriate persons to work on the military to mariner crosswalk, and that MERPAC identify the top three qualifications needing immediate attention to develop military to mariner credentialing crosswalks.

In response to the request, MERPAC reported the three top positions needing immediate attention for developing military to mariner credentialing crosswalks:

- engineering officers (licensed),
- engineer ratings (unlicensed), and
- deck officers (licensed).⁶



U.S. Rep. Duncan D. Hunter (third from left) speaks with CAPT Robert Hendrickson (first from left) and Vice Adm. Charles Ray (second from left) during a familiarization tour. U.S. Coast Guard photo by Petty Officer Connie Terrell.

Since writing this article, MERPAC has held a number of intercessional meetings to continue the momentum.⁷ Furthermore, congressional listening sessions and meetings between the stakeholders were also held to monitor the initiative. While there is a sense of momentum, a lot of work remains to be done.

About the authors:

Ms. Berit Eriksson sailed as an able seaman for 15 years with the Alaska Marine Highway, and has been the workforce development director for the Sailor's Union of the Pacific for the last eight years. Ms. Eriksson is also a MERPAC member representing unlicensed deck ratings and is chair of the Task Statement #30 subcommittee.

Ms. Zoe Goss is the director of marine development for Crowley Maritime Corporation. She sailed as an unlimited tonnage deck officer for six years and served in civilian federal service for eight years for the Maritime Administration and the Coast Guard. She is a commander in the Navy reserve with 17 years of experience.

Endnotes:

¹ Former Maritime Administrator, Chip Jaenichen, at the March 1, 2016, Military to Mariner Listening Session convened by the chairman and ranking members of the Subcommittee on Coast Guard and Maritime Transportation at the Rayburn House Office Building.

² Ibid.

³ Merchant Marine Personnel Advisory Committee, Task Statement 30 final recommendations.

⁴ Military to mariner panel convened at the annual Surface Navy Association Symposium, Hyatt Regency, Crystal City, Va.

⁵ Convened by the chairman and ranking members of the Subcommittee on Coast Guard and Maritime Transportation on March 1, 2016, at the Rayburn House Office Building.

⁶ Spring 2016 MERPAC meeting convened in Jacksonville, Fla.

⁷ MERPAC Task Statement 30, intercessional report from meeting at Fort Eustis, Va., on 27–29 April, 2016.



Repairing works on rudder and propeller of a cape size vessel. Photo by High Voltage / Shutterstock.

The U.S. Mariner Credentialing Program

How the National Maritime Center supports the military mariner.

by LTJG TREVOR AUTH
*Technical Support Branch Chief
National Maritime Center
U.S. Coast Guard*



The National Maritime Center in Martinsburg, West Virginia. All photos courtesy of the U.S. Coast Guard.

Coast Guard National Maritime Center (NMC) personnel ensure that approximately 212,000 professional U.S. merchant mariners are compliant with current regulations and are issued credentials efficiently. U.S.-credentialed mariners are responsible for vessels, cargo, and human lives upon a wide variety of waters, so the NMC ensures that only qualified professionals are granted credentials to operate those vessels.

The NMC processes approximately 65,000 merchant mariner credentials (MMCs) annually. Among those applying for a credential are former members of the U.S. military who have separated from active duty and afterward seek a career in the maritime industry.

Military to Mariner

As a traditionally seagoing service, the U.S. Coast Guard recognizes that a major source of potential candidates for merchant marine service lies within the U.S. military, which includes the other “sea services” — Navy, Marines — and, despite their images as land or air-centric services, the Army

and Air Force, as well. Many military members have sea service, and have qualified on the bridge or in the engine room of a vessel at a level potentially comparable to their civilian counterparts. Due to their familiarity with the discipline and shipboard routine obtained during their time in service, this represents a potential logical career path for those who prefer to be underway.

Further, professional opportunities for credential holders are not limited to positions aboard vessels; there are port facility, instructor, and local/state/federal government positions that require a valid MMC for employment consideration. Other industry employers may also look more favorably on former military members who hold credentials.

While the process of attaining a merchant mariner credential does take a considerable amount of time and effort,



A Coast Guard watchstander uses a sextant to get a celestial fix. Some navigation principles are largely unchanged between military and commercial vessels.

Special Assistance for Military Mariner Applicants

The NMC employs 45 legal instruments examiners who evaluate each mariner's professional qualifications to determine if he or she is eligible for the credential sought. Only the most experienced evaluators receive military evaluations, owing to the numerous factors that differentiate them from a standard merchant mariner application.

These evaluators have been trained to recognize the different forms of documentation that the military uses to report sea service and training as well as the different terminology the military uses when describing the service of its members and vessels. For example, service as a military machinist's mate, third class, may be considered equivalent to that of a civilian qualified member of the engine department.



Coast Guardsmen undergo firefighting training. Basic and advanced firefighting is very similar to the training required of mariners aboard commercial vessels.

Additional evaluators in the technical support branch handle military members' applications that require further support. These evaluators also assist military mariners who are unfamiliar with the credentialing process, so military applicants receive timely, expert review of their applications, as well as extra guidance if they require it.

holding merchant mariner credentials not only gives military members credibility with their counterparts in the civilian workforce—it also opens up doors to jobs and career opportunities in the public and private sector following separation from the military.

The Path to an MMC

Getting the MMC early on, while still in the military, may significantly relieve some of the stress associated with a job hunt after separation. If the member already has the credential in hand, he or she can divert energies toward other important matters. To this end, efforts are underway to establish a credentialing path for military members long before they leave active duty.

How to Apply

For all ex-military, documentation is your friend in the application process, and, while the National Maritime Center customer service center personnel can assist mariners through the credentialing process, the burden of submitting a correct and complete application rests with the applicant.

Therefore, the applicant should first inquire with any maritime companies that may employ him or her to find out what credential might be required. Secondly, the applicant should research what the requirements are for that specific credential. These are laid out in Title 46 of the Code of Federal Regulations, which outlines the type and amount of sea service required for each type of credential. Other useful avenues are the U.S. Coast Guard regional exam centers, which are excellent resources for prospective military mariners seeking information about the application process.

Transcript of Sea Service

The Coast Guard primarily uses a transcript of sea service (TOSS) to officially document sea time. The Navy has a similar form (the history of assignments), and the Army uses a standard memorandum to document mariner service. As these constitute official documentation, mariners need not provide an individual letter from each vessel they served aboard attesting to their time in service.

However, the TOSS or similar record is not the sole documentation required for many endorsements. For example, the transcript of sea service does not display the role the mariner played aboard the vessel. For most officer endorsements, such as third mate, documentation such as a deck watch officer designation memo, signed by the commanding officer, is required to prove the applicant is qualified to stand a bridge watch.

The NMC is working proactively to enhance the TOSS to include such fields as vessel tonnage and position held while underway. Until the transcript of sea service is updated, military members are strongly encouraged to provide as much documentation of their service as possible.

Seven-Year Recency

For those with service on vessels of the uniformed services, the 2014 Howard Coble Coast Guard and Maritime Transportation Act authorizes recency to be calculated within the last seven years before the application date. The previous recency requirement—90 days of service aboard appropriate tonnage within the previous three years—put military members, especially those in more senior positions removed from the afloat community, at a severe disadvantage. According to the law, if a mariner serving aboard a

U.S. Coast Guard Mariner Credit

At the Academy

One of the most recent Coast Guard efforts to expand the opportunities of military members in the merchant marine is the new initiative at the U.S. Coast Guard Academy that creates a program for cadets to earn an MMC at graduation. Beginning with the class of 2016, qualifying graduates now have the opportunity to obtain a domestic-only merchant mariner credential endorsement as a master of less than 100 gross registered tons upon near-coastal waters.



U.S. Coast Guard Academy cadets celebrate. The class of 2016 was the first to leave the academy with a credential in hand.

Furthermore, after academy graduation, officers in the U.S. Coast Guard are eligible to sit for national endorsement third mate or third assistant engineer exams once they obtain qualification as an underway officer of the deck or underway engineering officer of the watch. Going through the experience and process of obtaining a merchant mariner credential improves the

aptitude and understanding of our academy graduates who are destined to become future deck and engineering officers, marine inspectors, and overall competent decision makers. It also gives them valuable insight into the maritime community they serve. Moreover, obtaining either of these endorsements could allow a transitioning Coast Guard officer to serve aboard a merchant vessel, opening up opportunities in the deep-draft vessel industry.

Active Duty Credit

The U.S. Coast Guard has also explored numerous options that would allow its members to receive credit for formal schools and training received while in the U.S. Coast Guard. Already, the Coast Guard's "Leadership and Management School" course has been approved to meet the requirement for the leadership and managerial skills course required for upper-level endorsements. In addition, the Coast Guard has two approved programs for its machinist's mate and boatswain's mate rates, toward engine and deck credentials, respectively. As members gain experience and responsibility while rising through the ranks, they can continuously upgrade their MMC to make it commensurate with their competency level.

The Coast Guard is also exploring merchant marine courses that may be used in lieu of certain military examinations. In particular, the NMC is actively working with the U.S. Coast Guard Institute to allow the maritime rules of the road (ROR) exam that personnel serving on Coast Guard cutters must take to equal the deck watch officer (DWO) exam. Because a prerequisite of any seagoing merchant marine officer's license is a ROR exam, known as the Q100 module, a mariner who holds a current MMC with an officer endorsement is deemed "qualified" in ROR and would not need to complete the deck watch officer version. However, this is not an interchangeable policy: a deck watch officer who completed the DWO ROR exams would not be exempted from the Q100 module, should he or she choose to apply for a merchant mariner credential.

vessel of the uniformed services has 90 days of service on the appropriate tonnage within the last seven years, he or she has met the requirements of recency.

Qualifying service may be earned on vessels of the Army, Navy, Air Force, Marine Corps, Coast Guard, National Oceanic and Atmospheric Administration, and Public Health Service, and may be earned regardless of status of the applicant on the uniformed service vessel (e.g., active duty military or civilian mariner). Individuals who have the qualifying service as indicated above are eligible for this consideration regardless of present status. Therefore, active duty members, reservists, retirees, recently separated personnel, and civilian mariners with qualifying service on vessels crewed by uniformed services personnel are eligible to be considered under these provisions.



Like navigation, engineering aboard a Coast Guard vessel bears many similarities to the commercial fleet. Here, a Coast Guardsman conducts maintenance on a bulkhead.

From the Desk of CG-MMC: The Program

For most of its existence, the Coast Guard's merchant mariner credentialing program was splintered into different offices. On July 1, 2016, the Office of Operating & Environmental Standards' Maritime Personnel Qualifications Division and the Office of Commercial Vessel Compliance's Mariner Credentialing Program Division were restructured to form one centralized office.

The Office of Merchant Mariner Credentialing now encompasses both divisions' world of work into one office under the leadership of the Commercial Regulations and Standards Directorate. Additionally, technical control of the National Maritime Center was transferred from the Director of Inspections and Compliance to the Director of Commercial Regulations and Standards.

This improves mission execution and organizational efficiency by ensuring all aspects of the Coast Guard's credentialing program report to a single directorate, and by creating one centralized office at Coast Guard headquarters.

The program is already realizing significant benefits in the short time since the office was stood up. For example:

- **Improved customer support:** Mariners, ship operators, and maritime academies frequently have questions and issues related to credentialing standards. Since consolidating the mariner credentialing program into a single office, we have experienced faster and more consistent responses to the maritime industry and the National Maritime Center, which is responsible for issuing the credentials.
- **Consistency:** With a single director and chain of command for mariner credentialing, we now ensure consistent standards creation, implementation, and interpretation.
- **Efficiencies:** We no longer experience situations where two staffs from two different directorates and the NMC are simultaneously researching responses to the same inquiry.

Feedback

The NMC website provides military mariners ample opportunity to provide their feedback on our program, and we want to hear from you! We recognize that many of the mariners we serve are highly motivated to succeed in their career paths, and we want to do everything within our power to enable them to do so.

As a relatively new source of mariners, the military has massive potential for providing a pool of highly motivated, intelligent, and resourceful applicants for MMCs. Your honest critique of our military to mariner program will provide us with valuable insight from our customers, which will in turn help us to better serve you.

About the author:

LTJG Trevor Auth is the National Maritime Center technical support branch chief. He graduated with a civil engineering degree from the U.S. Coast Guard Academy and then spent two years aboard CGC Vigilant.

For more information:

All statistics courtesy of the National Maritime Center. The NMC website is available to assist any mariners who wish to do their own research, and provides step-by-step guidance to complete the merchant mariner credential application and prepare for examinations.

It also hosts a wealth of useful information, such as how military sea service is credited, the importance of recency, and common pitfalls to avoid.

For further reading, there are also links to Title 46 of the Code of Federal Regulations and the Marine Safety Manual, Volume III, both of which contain valuable information for the military applicant.

The link to the NMC website is:
www.uscg.mil/nmc/

Tell Me About It

Merchant mariner credential advice from veterans.

by MR. SAM TEAGUE
*Office of Merchant Mariner Credentialing
U.S. Coast Guard*

The maritime industry has taken significant steps to recruit veterans. Military to mariner events, which are held in areas with a large maritime presence, have been successful at showcasing what the industry can offer veterans in the way of a future career that complements their current skills and provides competitive pay.

Even so, a majority of veterans still have no idea their skills are in demand, or they simply don't know how to go about getting a merchant mariner credential (MMC), so we tapped some experts for their advice.

Show Me That Horizon

Captain Margaret Reasoner, director of labor and operations for Patriot Contract Services, notes that veterans should start the process of obtaining their credential as early as possible, ask a lot of questions, and talk to everyone.

"If a military member enjoys going to sea, then research the benefits and perks of going to sea commercially. The maritime industry offers good pay, significant time off, and a bit of added comfort and communications. Time in the military is better translated to sea time when reviewed prior to discharge from service. The military now has better opportunities for additional training during transition to achieve the highest MMC endorsement possible. The U.S. Coast Guard also now has better interpretive guidance for military service," she said.

"Reach out to the unions and employers! The maritime industry can be complex and confusing—even to those in it! Regulations and training requirements have recently changed, impacting all mariners and employers.

"Everyone has an individual perspective and story as to how they did it. If you have a goal or target based on your service expertise, reach out to an employer with those needs and ask which union they affiliate with and who you should talk to regarding membership and qualifications."

That is industry's perspective, and it is very good information. However, it is extremely important to ascertain what actions veterans took to obtain an MMC. That's why I asked veterans about their current job title/descriptions, military service, awareness of civilian maritime opportunities, difficulties in getting a credential, and recommendations for other veterans.

"Members of the military have a high sense of discipline and commitment. Veterans are used to hard work, demanding work, and following procedures. They understand teamwork and the cooperation needed to perform well on a task or mission. These characteristics translate well into the commercial maritime industry."

—Captain Margaret Reasoner, director of labor and operations, Patriot Contract Services LLC

Veterans' Stories

Leslie Ansag

Ms. Leslie Ansag served 26 years in the U.S. Navy as a surface force independent duty corpsman. She found out about the Military Sealift Command (MSC) through an impromptu meeting at an independent duty corpsman conference many years ago. At the time, she was not aware of maritime unions nor the private companies that work hand-in-hand with them to provide support for ships.

Union Assistance

Her information about civilian merchant mariners came after submitting her résumé directly to the Seafarers International Union after medical positions within the MSC became stagnant. A chance phone call from Patriot Contract

“Veterans are especially good employees who understand being away from home and how to operate with strict processing rules.”

— Kyle Buese, general manager of vessel operations, Kirby Inland

Services began her journey into the realm of the merchant marine.

Today she is a medical department representative. She currently holds the following endorsements: hospital corpsman, ordinary seaman, wiper, and stewards department. She has also completed the following training:

- medical first-aid provider, person in charge of medical care;
- basic training;
- vessel personnel designated with security duties;
- security awareness.

Mentoring

Ms. Ansag found that there was a big learning curve between the Navy and the civilian maritime industry. However, she easily overcame this, due in part to being taught in the military to listen and learn.

She also quickly learned to find the person on board with the most experience and time in the industry as her mentor. In her case, it was the chief steward, who also happened to be a retired Navy chief. The information he provided was a boon that allowed her to transition into the industry quite well. There was new jargon and rank to learn, but she easily committed it to memory.

The Military Advantage

Her current position on the ship is basically the same as that of her Navy career, and she strongly believes her military service made the transition into the civilian industry much easier. She believes that the ability to work with the military as well as the mariners with prior military service in her new position has had a positive impact on her transition. She also feels the camaraderie is still there, which makes the work environment seem more like the teamwork she was familiar with.

An MSC recruiter provided her a list of steps to obtain her credentials, which included information on getting a Transportation Worker Identification Credential (TWIC), getting her passport updated, and taking some classes like first aid and basic safety training. The list provided her a tremendous

amount of helpful information. Despite not joining the MSC, she believes asking for help was the right first choice in the transition from the military to the maritime industry.

Best Tips

- Begin the process 6–12 months prior to leaving the military, whether separating or retiring. To obtain the documents necessary to even apply for a position requires planning, and many documents take time to obtain.
- Set aside money for the transition, as documents are not free and most training comes with some monetary requirement.
- Talk to people before making the transition. This is a new career path, and, like any other career choice, you need to do some research first.

“Since the maritime industry is actively in need of skilled mariners, most will be very proactive and helpful to provide information and opportunity.”

— Captain Margaret Reasoner, director of labor and operations, Patriot Contract Services LLC

Thomas Cook

Mr. Thomas Cook retired from the Navy in 2007 after serving 20 years. He initially enlisted as signalman, but the rating was eliminated in 2004, and Mr. Cook was converted to boatswain mate. He currently serves with the MSC aboard the USNS *Soderman* as an able seaman/boatswain (AB). He became aware of the merchant marine when a friend of his left the Navy and began working as an AB with the MSC as a civilian mariner.

Mr. Cook notes that documenting his sea time was fairly simple, using his record of sea service; however, fulfilling the requirements for qualifications as lookout and helmsman (required for designation as AB) was more difficult. In the Navy, he was a qualified underway officer of the deck, so with the help of a Coast Guard training coordinator, he was able to use his service to fulfill those particular requirements and was issued his MMC in 2009.

He has found that working for the MSC isn't much different from the Navy. Both agencies require you to maintain qualifications and paperwork and complete training. However, he did discover that working within the commercial container ship industry as a boatswain was a much more simplified experience, even though union work and shipping rules are often complicated and take time to understand.

Other than union rules and the work/rest regulations, Mr. Cook found that life and work aboard commercial ships was very livable. As an added bonus, the financial compensation was more than three times higher than pay for comparable work in the Navy for deck ratings.

The Search

When Mr. Cook started his quest to become an AB, he had no idea what to expect regarding the process. He did search the National Maritime Center's (NMC) website for requirements, and conducted an internet search for able seaman schools. He found a school in Fremont, Washington, and was able to get a grant from the Washington State Workforce Development Council to cover training costs.

He also went to a local union hall, but found that the hall wasn't the best fit for him. He ultimately found the Seattle branch of the Sailor's Union of the Pacific. The agent was very helpful and gave him clear guidance on what steps to take next, which was to attend classes to fulfill requirements for MSC-contracted ships. He was then dispatched as an AB to the USNS *Waters*, which was then operating out of Port Canaveral, Florida.

Work Options

Mr. Cook notes that there are different types of work options. "Non-union work can appear very attractive monetarily, but you are subject to the whims of the company. While the money may sound great, there is generally no pension plan and spotty health coverage," he says. Mr. Cook still works with Sailor's Union of the Pacific. He works on contracts lasting four to six months, usually overseas, and takes as much time off between jobs as he desires.

Another possibility is work with the Military Sealift Command as a civilian mariner. As a government employee, you get 30 days vacation per year and receive all the benefits federal government employment entails. However, there is very little say as to where you go, and you are assigned to ships based on the MSC's needs. That said, it is steady, reliable work, and you get paid even while waiting for assignments.

Best Tips

- Keep a full copy of your service and medical records. Pay particular attention to a complete listing of your personnel qualification standards and any other qualifications. Before you separate, ask your command career counselor for the paperwork to request an official record of sea service.
- Use the NMC website. The NMC will treat you well and will answer your questions satisfactorily.

In Sum

If you are a veteran and want to start a career in the maritime industry, review the NMC's website and call 1-800-IASKNMC. In addition to your GI benefits, check with your state government representatives to see if there are any benefits or grants to assist you in covering the cost of training required to obtain your credential.

About the author:

Mr. Sam Teague works in the Office of Merchant Mariner Credentialing at Coast Guard headquarters. He retired from the Coast Guard in 2015 after serving 22 years in the U.S. Coast Guard and four years in the U.S. Army.



Mariner Medical Improvements

Maintaining our human capital.

by DR. ROBERT M. BOURGEOIS, MPH, FACOEM
Merchant Mariner Medical Advisory Committee

We have seen a lot of changes in mariner medical issues in the past 20 years. To mitigate them, NVIC 02-98 gave mariners and maritime physicians an outline of medical conditions, guidelines, and expectations for evaluations. As a result, the application form (CG-719K), a credential medical evaluation report/physical form, was improved, but only slightly: The instructions for physicians and information that it gathered were minimal. Finally, a series of merchant mariner medical issues in maritime incidents raised a call for review of the medical guidelines, medical forms, processes for form handling, and the medical review process.

For example, allisions involving the ferry vessel *Andrew Barberi* and motor vessel *Cosco Busan* revealed multiple areas in the medical credentialing process that needed improvement.¹

Improvements

To make the necessary improvements, the Coast Guard Merchant Marine Personnel Advisory Committee (MERPAC) and several occupational medicine physicians worked for several years on NVIC 04-08, the new medical and physical evaluation guidelines for merchant mariner credentials, and the CG-719K.

In addition, the Department of Homeland Security appointed healthcare providers and professional mariners to a new Merchant Mariner Medical Advisory Committee (MEDMAC), created in 2012, to advise the Coast Guard on mariner medical issues.

Fitness For Duty

The fact is, our U.S. mariners are aging, and the increase in average age contributes to additional medical conditions they're experiencing. New medical guidelines involve more detailed and more frequent medical examinations, so rather than perpetuating the practice of trying to get healthy enough to pass a physical only one day every five years, the goal now is for each mariner to be healthy enough to pass any physical exam any day of any week.

Fitness for duty is every mariner's responsibility. This protects the public, the mariner, and other members of the crew. For example, when crewmembers aren't fit for duty, medical evacuations put the mariner, other members of the crew, and the vessel at increased risk. Most medical evacuations from offshore are not related to occupational injury or trauma—approximately 80 percent are related to pre-existing medical issues.²

The Guidelines

The medical guidelines in NVIC 04-08 are the minimum standards required for



Above is damage to the 900-foot container ship *Cosco Busan*. The damage occurred after the cargo ship hit the San Francisco Bay bridge, spilling bunker fuel into the San Francisco Bay. U.S. Coast Guard photo by Petty Officer Melissa Hauck.

a mariner to obtain a credential. However, the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), 1978, as amended, and medical guidelines from individual companies, specific contracts, or for remote locations may have higher standards.

Some of these higher standards are based on remote location, job function, and time or distance from medical care. The basic requirements for all fitness for duty examinations are that the mariner is able to perform all regular and emergency duties and be reasonably free from conditions that pose significant risk of sudden incapacitation or debilitating complication.

Mariner Wellness

The good news is that more maritime unions, companies, and trade associations are getting involved in mariner wellness programs. Many entities have realized that programs for human capital maintenance are as important as those for vessel and equipment maintenance. No one would ever sail on a vessel that had not been maintained for 20 or more years, yet, for many mariners, their only encounter with a healthcare provider is for a merchant mariner medical exam. As the frequency of exams is increasing with changes to STCW and many contracts, mariners who maintain their health are able to complete and pass the exams easily.

Routine health maintenance is a key part of the fitness for duty process, as most medical issues, if properly addressed and maintained, are easily cleared for medical certification. Some tips for the merchant mariner: Look for a healthcare provider with proper credentials (MD, DO, NP, PA); licensed in that state; with experience in maritime medicine and/or occupational medicine; and knowledge of Coast Guard, STCW, and NVIC 04-08 medical guidelines.

Mariners can improve their overall health by several methods. First, wellness applications that track physical activity and caloric intake are now readily available and work on most smartphones, tablets, or laptops. Besides tracking exercise, calories, sleep, and weight loss, some applications include smoking cessation, exercise, and dietary advice.

A good diet, regular exercise, smoking cessation, and regular medical screenings are essential to staying healthy, working longer, and living longer. Some maritime operators have even improved the quality of the meals served aboard their vessels, largely through concerted efforts among a dietician and the master and chief steward of each vessel to include healthy alternatives in the vessel's menu. These changes have been well received by most mariners.

Addressing Common Medical Concerns

Be as accurate as possible when completing the medical history on the most recent CG-719K; failure to do so may lead to processing delays. If you have an active medical issue that may keep you from passing your medical exam, you may file for continuity on the USCG Form 719B.

Below are the most common medical concerns physicians see when conducting medical examinations as well as recommended tips you can take to address them.

■ Vision Requiring Correction

You may need adequate correction to meet the vision standard for far vision of at least 20/40 in each eye for deck endorsements, and 20/50 in one eye for engineering, radio officer, tankerman, and mobile offshore drilling unit (MODU) endorsements.

Color vision testing is most commonly done with vision screeners, but if you are unable to pass the more common tests, your healthcare provider can use a Farnsworth Lantern or the new version of it: the OPTEC 900. Additional testing for engineer, radio officer, tankerman, or MODU endorsements may only use the Farnsworth D-15 hue test.³

Tips:

- Wear clear, untinted lenses during color vision testing. If you wear corrective lenses, bring them with you to your physical.
- You should also have a second pair of glasses with you at all times on your vessel.
- If you have eye surgery or wear contact lenses, it is not advisable to have one eye corrected for far vision and one for near. This will often result in an inability to pass the far vision requirement without additional correction. You would then be required to wear corrective lenses at all times. This can also alter your far vision depth perception. If you wear prescription glasses for far vision, it is much easier and cheaper to get clear lenses with dark clip-on flip-ups for sunny days.



Photo by Sergey Mironov/Shutterstock.com.

■ Hypertension

Take your medication daily. Overpressurizing a hose will eventually cause it to fail. Hypertension has the same effect on your arteries.

Tips:

- Get a blood pressure monitor for your upper arm (not your wrist or thumb).
- Bring it with you to your doctor appointment and check it against the clinic's device for accuracy, making sure to learn how to properly position the blood pressure cuff.



Photo by JPC-PROD/Shutterstock.com.

■ Diabetes

Most diabetics are able to achieve adequate control of their diabetes without insulin. Many physicians will want to check a HA1C (average blood sugar) level at least every three to six months. This level should be less than 8.0.

Tips:

- You will need two HA1C readings of less than 8.0 separated by at least 90 days when you submit a CG-719K.
- The physician will also need to see your complete medication list and, if prescribed insulin, your glucose log.

■ Obstructive Sleep Apnea

If your body mass index (BMI) is 40 or higher, you should have a sleep study. If the study proves positive for sleep apnea, you should treat the condition with a continuous positive airway pressure (CPAP) machine.

Tips:

- CPAP machines will record hours per use each day. The minimum for use is more than four hours at least 70 percent of the nights in the log period.
- Provide at least 12 months of use on your log for your merchant mariner medical exam.
- If you have surgery to treat sleep apnea, you will need a sleep study afterward to document successful treatment. If the surgery failed, you will still be required to use a CPAP machine.

■ Obesity

If your BMI is greater than 40, you may have to demonstrate some of the physical abilities listed on the CG-719K.

Tips:

- Diet and exercise are the keys to weight loss. Losing weight is all about caloric supply and demand. If you eat and drink fewer calories than you burn, you will lose weight.
- Fad diets and radical low calorie diets may show early weight loss, but to maintain the loss, you need a diet and exercise program that you can live with.

■ Cardiovascular Issues

If you have had a heart attack, angioplasty, stents, bypass surgery, valve repair or replacement, ablation therapy, or any other cardiac procedures or dysrhythmias, you will need a record of the events preceding the procedure, the procedure itself, and follow-up clinic visits.

Tips:

- Have regular clinic visits. The current medical NVIC is a good guideline for your cardiologist to ensure that you get the appropriate testing prior to your mariner medical exam.
- Some of the more commonly required tests include: functional stress test, nuclear stress echocardiogram, and a 24-hour Holter monitor test. One or more of these tests may be necessary, depending on your personal cardiovascular condition.

■ Medication Issues

There are some classes of medications that may impair a mariner's abilities by causing drowsiness or altering cognitive ability, judgment, or reaction time. These include but are not limited to the following: antidepressants, antipsychotics, anticonvulsants, sedating antihistamines, barbiturates, benzodiazepines, sedatives, sleep aids, diet aids, stimulants, some cough preparations, legally prescribed controlled



Photo by Wellford Tiller/Shutterstock.com.

substances, hallucinogens, muscle relaxers, and some anti-motion sickness agents. Most of these may not be taken at any time while on a vessel. Others may be taken with some time interval between the last dose and when acting under the authority of a credential.

Some medications increase the likelihood of illness at sea. These may impair a mariner's ability to perform routine and emergency duties. These include central nervous system depressants and stimulants, medications that increase the likelihood of sudden incapacitation, and medications that impair vision.

Some medications may have serious adverse side effects for the user while underway. This includes medications that can cause prolonged bleeding, dangers from cessation, or long-term or periodic need for antibiotics or other anti-infection agents. For example, anti-metabolites and some cancer treatments impair immune response. While on these medications, an otherwise mild respiratory infection can rapidly progress to a life-threatening pneumonia. Most of these infections cannot be adequately treated on a vessel and may require urgent hospitalization.

Further, many diabetics have been treated with insulin but are not insulin-dependent. Most diabetics may be able to control their disease on the newer medications without using insulin. The risk of low blood sugar is much less in

many of the newer non-insulin medications. Mariners with adequately controlled diabetes without insulin use are much easier to evaluate and clear for maritime duty.

Tips:

- If you are on any of the above medications, you will need your healthcare provider's records on the medications (medication dose and frequency) and conditions requiring the medications.
- There may be other acceptable alternative medication(s) for your condition(s). Check with the National Maritime Center or consult an occupational medicine physician with maritime medical experience.

About the author:

Dr. Robert Bourgeois has been board certified in occupational and environmental medicine since 1996 and was previously board certified in emergency medicine for 20 years. He has served on the Merchant Mariner Medical Advisory Committee since its inception and lectures frequently on mariner medical issues, fitness for duty, and wellness.

Endnotes:

- ¹ Allision of Hong Kong-Registered Containership M/V *Cosco Busan* with the Delta Tower of the San Francisco–Oakland Bay Bridge, pages 137–138—Highlighted Recommendations. San Francisco, California, November 7, 2007.
Allision of Staten Island Ferry Andrew J. Barberi, St. George, Staten Island, New York, October 15, 2003. Marine Accident Report NTSB/MAR-05/01.
- ² D.P. Thibodaux, R.M. Bourgeois, R.R. Loeppke, D.L. Konicki, P.A. Hymel, and M. Dreger, Medical evacuations from oil rigs off the Gulf Coast of the United States from 2008 to 2012: Reasons and cost implications. *Journal of Occupational and Environmental Medicine* 2014; 56(7):681-685.
- ³ See USCG 719-K, Vision, Section IV(b) for acceptable tests and passing scores.

For more information:

For additional information on merchant mariner medical examinations, forms, or medical guidelines, see the following sources:

- URL: <https://www.uscg.mil/nmc/medical/default.asp>
- E-mail: iasknmc@uscg.mil
- Phone: 888-427-5662
- Mail: National Maritime Center
100 Forbes Drive
Martinsburg, WV 25404



The Next Evolution in Safety Management

A working human.

by Ms. EMILY REIBLEIN
Manager of Operations Integrity
Crowley Maritime Corporation

Safety performance is on the forefront of every conversation we have in the commercial maritime industry. Typically, this involves risk reduction, augmenting controls, training, and protection barriers. But what if our conversation is missing the single greatest limiting factor that can make or break the rest—a functioning human?

For example, if a mariner’s eyes don’t work, or his or her adrenal glands are not operating properly, or the musculoskeletal system doesn’t properly operate, that mariner is going to be a detriment to safe vessel operation.

But can we “manage” our way to a stronger maritime workforce? There is largely unexplored territory between what we desire and our perception of what we can change. That said, systematically working through wellness issues can bring us to a place where high performance, safety, and health meet. This can create a work environment that changes the expectations we have of ourselves, safety, and our quality of service.

Lifestyle Changes

Are lifestyle choices too far-fetched to manage? My company surveyed mariners to determine their interest, then

initiated trial projects focusing on healthy nutrition, supporting education, and expanding micronutrient content in the diet.

Stewards then literally “cooked up” new recipes that were low in glycemic load and high in varied micronutrient content. Approximately 85 percent of mariners ate the new foods and provided swift (and occasionally scathing) feedback. Even after poorly received attempts, the mariners continued to participate, demonstrating that mariners will engage (and keep engaging) in efforts to improve their shipboard wellness—even if the picture is far from perfect.

Further, although individual needs differed, overall these trials have found that we have the ability to engage people in lifestyle choices that are healthier and can help build a better, more functional human.

The Results

In the end, our safety and quality system’s success is not solely based on written procedures or engineering controls. It is based on how we employ them on our worst days. Raising the bar for an individual, at that moment, is where safety will truly take its most active and advanced form.

The pursuit of wellness programs can pave the way for safety to become a well-thought-out choice. The goal of any wellness program is to create a mind that can plan, process, and engage safely, and a body that can follow the decisions made to ensure our greatest, highest measure of performance.

About the author:

Ms. Emily Reiblein is the manager of operations integrity at Crowley Maritime Corporation, where she focuses on customer service in Terminal Operations and also wears a separate hat running the Terminal & Union Member Wellness Program for their 3000 union members. She is a graduate of Massachusetts Maritime Academy.



Photo by Timolina/Shutterstock.com.

Partners in Towboat Wellness

A model for mariner well-being programs.

edited by Ms. LISA RIGO
Director
HR & Creative Services
Ingram Marine Group

As part of a partnership with Vanderbilt Medical Center, Ingram Marine Group worked to implement the Coast Guard's 2003 Crew Endurance Management System (CEMS) program. Ingram mariners gained sleep improvements through physical enhancements such as adding room-darkening shutters aboard vessels. Ingram also began annual CEMS training to educate its mariners.

Life Aboard

To understand wellness issues aboard a towboat, you have to understand a bit about the barging industry. Most towboat vessels have a nine-person crew who work a 28-day schedule (28 days on the vessel and 28 days off). The captain and pilot work alternating six-hour watches for the entire time the crew is aboard the vessel. This work schedule is the key to understanding the health needs of a river crew — and a big reason why Ingram contracted with Vanderbilt.

A typical captain might awaken at 4:30 a.m. and take the sticks at 5:30 a.m. for the first watch. That watch ends at 11:30 a.m., and he or she hands the controls over to the second in command, the pilot. After the pilot's six-hour watch concludes, at 5:30 p.m., the captain retakes control. At 11:30 p.m., the pilot returns to work through the dark hours until the captain is back the next morning at 5:30. The cycle begins again.

Well-being can be a challenge anytime, let alone when aboard a vessel for four weeks at a time. Though the deck crew's job has a lot of exercise built in, a captain's or pilot's job does not, so the quest for a healthy lifestyle can be tough. Here's where the partnership between Vanderbilt and Ingram began to move beyond a CEMS program/focus on sleep patterns, with an added goal to increase wellness among Ingram's mariners.

Working the Program

In January 2004, the Vanderbilt team and Ingram's human resources team met to discuss ways to improve mariners' health. The group developed a "partners in towboat wellness" program, through which captains, pilots, and other personnel from Ingram received comprehensive physicals, labwork, treadmill tests, and healthy living guidance for risk factor reduction.

Vanderbilt nurse Teresa Roberts looked for issues that could delay a captain's or pilot's licensing requirements and worked diligently to better understand the navigation and vessel inspection circular providing detailed guidance about compliance with certain federal marine safety regulations and U.S. Coast Guard marine safety programs. She also worked to establish a close working relationship with the medical team at the National Maritime Center to identify areas where Ingram could improve, including offering



A deck crew associate's job has exercise built in. Pictured are senior mate James Fields (left) and second locking mate Kevin Brumley (right). Photo courtesy of Ingram Barge Company.

Participant Feedback

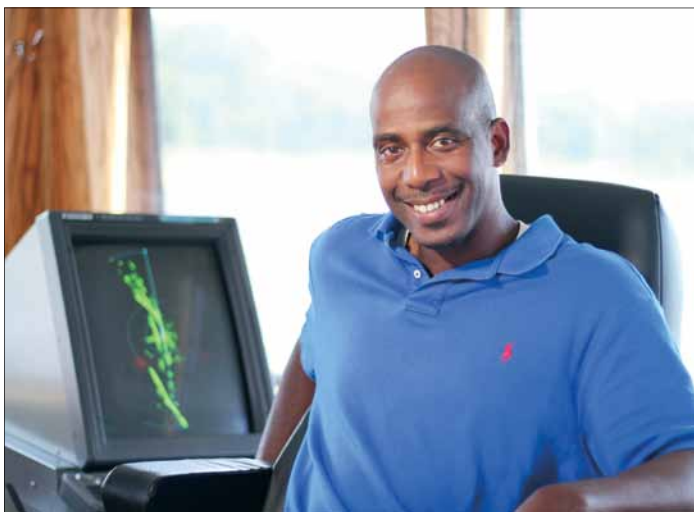
Some of the participant feedback includes:

- “Since I’ve come to work at Ingram, the quality of my life has definitely improved. Nurse Teresa makes me feel like part of the family. I just can’t say enough about what she does for us.”
- “I’m glad Ingram took the time to set it up for us. Teresa sends e-mail tips and reminders. I’ve always had a good experience.”
- “At first I was resistant. But it’s been good. I try to park a little farther away when we go to the store. I try to cut down on red meat. It’s a process. As good as Teresa has treated us — that makes a difference, too.”

opportunities for associates to engage in physical exercise. Ingram then added treadmills or similar exercise equipment aboard vessels that had a bit of extra space. Over time, Ingram has provided exercise equipment for all vessels and at every facility. In addition, Ingram has a generous associate gym reimbursement policy.

Partners in Towboat Wellness

As towboat captains and pilots must meet certain health standards to renew their USCG licenses, every five years the Coast Guard requires all applicants who have a merchant mariner license to complete a comprehensive medical and physical evaluation. Through the towboat wellness program, Ingram implements interventions to decrease and/or control health problems that could lead to disqualification as a licensed mariner.



A towboat captain's or pilot's job can be quite sedentary, so the quest for a healthy lifestyle can be tough. That's why the Ingram Marine Group partnered with the Vanderbilt Medical Center to develop a "partners in towboat wellness" program. Pictured is pilot Marvin Stevens. Photo courtesy of Ingram Barge Company.

Since the license renewal cycle is five years, the Vanderbilt team checks each participating Ingram associate every two-and-a-half years, providing plenty of time to correct any health concerns. Keeping captains and pilots healthy is good for them, of course, and also good for the company, as it loses fewer associate workdays to delayed license renewals.

“We continue to see a reduction in risk factors and improved health among the Ingram associates,” Nurse Roberts says. She cites statistics from participants in the program, including:

- a five-pound average decrease in participant weight,
- 13 percent have improved A1C levels,
- 75.3 percent are within normal guidelines for cholesterol levels,
- 31 percent quit smoking,
- 10 percent improved their blood pressure.

Sleep Apnea Screening

Workers in the transportation industry generally have a disproportionately high incidence of sleep apnea, a disorder in which a person stops breathing for short periods of time while sleeping. In the general population, sleep apnea occurs in about 28 percent of adult males. For truck drivers, the estimate can be as high as 50 percent.¹

In light of these statistics, in 2006 Ingram developed a partnership with Northwestern University's Dr. Fred Turek and initiated what became a five-year towing vessel sleep research program. Initially, a consortium of several American Waterways Operators member companies funded the research. Because they found correlations to other health issues they were finding in the partners in towboat wellness program, this sleep study became the catalyst for another Ingram/Vanderbilt partnership, through which the Vanderbilt Sleep Center helped Ingram with sleep apnea screening, treatment, and coaching.

“By its nature, piloting towboats is sedentary,” explains Dr. Raghu Upender, medical director of the Vanderbilt Sleep Center. “When you add a high-calorie diet, limited opportunity for exercise, and interrupted sleep, there is high incidence of obesity in this population. Obesity is one of the major risk factors for sleep apnea.”

In an initial cohort of 16 captains and pilots with a body mass index (BMI) over 40 who were given sleep studies, all 16 were diagnosed with sleep apnea. Sleep apnea is treated with a continuous positive airway pressure (CPAP) machine, which uses a face mask to deliver mild pressure to keep the airway open. Unfortunately, in wearing it, patients often find it difficult to adjust to.

Patients in the program average CPAP compliance of 80 percent, compared to about 50 percent in the general population.² That success is credited to Patience Bridges, the initial project coordinator of the Vanderbilt Sleep Division. Once a towboat captain or pilot is diagnosed with sleep apnea, he or she is required to report proof of CPAP compliance to the Coast Guard. Bridges made it her mission to get the patients to 100 percent CPAP compliance.

“All of the patients get set up online for monitoring and troubleshooting purposes,” Bridges says. “A big part of my job was to expel the fear that surrounds using CPAP and wearing a mask at night. Honestly, it’s very difficult to get a patient acclimated if we don’t stay with them through the first 30 days. Knowing that they have someone trying to work with them is a big deal.”

The program has been so successful that Ingram and Vanderbilt Sleep Center have now expanded the program to associates with BMIs below 40.

Expanding the Program

Over time, the partners in towboat wellness program grew to include engineers and cooks on the vessels, the theory being that, by increasing the wellness awareness of these key crewmembers, together they could impact the overall health of the entire crew.

Nurse Roberts worked with the cooks, collecting favorite recipes from them and sharing them with Vanderbilt dietitians, who suggested substitutions to make them heart healthy. Healthy cooking then became part of the standard cook training modules.

Nurse Roberts has also expanded her role and skill set over time. She became Vanderbilt’s first certified health coach and also became dedicated to assisting with the comprehensive physical and U.S. Coast Guard license renewal process. She works closely with the National Maritime Center in West Virginia and attends Merchant Mariner Medical Advisory Committee meetings.

Because Ingram has associates all over the U.S., not all of the participants in the Vanderbilt-Ingram partnership are able to get to Nashville for their physicals, so Ingram has also expanded the number of locations available for partners in towboat wellness physicals. Off-site clinics, working under Roberts’ oversight, have been contracted to participate in the physicals.

Health Coaching — and an App

Innovation between Ingram and Vanderbilt doesn’t stop there. The newest wellness option available is an app called



The Vanderbilt Wellness Team: Dr. Raghu Upender (left), medical director of the Vanderbilt Sleep Center; and Teresa Roberts, R.N. (right), Vanderbilt Executive Health are instrumental in Ingram’s wellness initiatives for mariners. Photo courtesy of Vanderbilt University Medical Center.

Wellframe. A personalized guide to a mariner’s health via a daily health checklist, it’s basically like a GPS for a mariner’s health and wellness. As health tasks are completed each day, the Vanderbilt team is updated on progress and sends instructions with secure messaging to help the mariner better understand and manage his or her health.

Nurse Roberts and members of the sleep team are assigned as health coaches. “In my health coaching role,” she says, “I partner with Ingram associates to empower them to take control of their health through meaningful lifestyle changes that can reduce their risk factors for developing chronic—many times preventable—diseases. And, along the way, they discover that they are not just healthier, but they feel better!”

About the author:

Ms. Lysa Rigo has been with Ingram Marine Group for 11 years and oversees all things creative. She and her team most recently received an award of excellence from the International Association of Business Communicators.

Ms. Rigo notes that this article is a compilation of previous articles and narrative she collaborated on with other Ingram and Vanderbilt Medical Center associates.

Endnotes:

¹ C. Zhang, MD, MPH; M. Berger, MD; A. Malhotra, MD; & S.N. Kales, MD, MPH, 2012. *Portable Diagnostic Devices for Identifying Obstructive Sleep Apnea among Commercial Motor Vehicle Drivers: Considerations and Unanswered Questions*. Retrieved December 29, 2016, from https://www.researchgate.net/profile/Atul_Malhotra2/publication/232744390_Portable_Diagnostic_Devices_for_Identifying_Obstructive_Sleep_Apnea_among_Commercial_Motor_Vehicle_Drivers_Considerations_and_Unanswered_Questions/links/545f89ba0cf295b56161c5bb.pdf.

² A. O’Connor, April 9, 2012, *Treating Sleep Apnea Without the Mask*. Retrieved December 29, 2016, from <http://nyti.ms/1cvXeW6>.



Improving the Medical Certificate Application Experience

Lessons learned from medical appeals.

by DR. ADRIENNE BUGGS, FACEP
Medical Policy Advisor
Office of Merchant Mariner Credentialing
U.S. Coast Guard

Let's face it: No one wants to have their medical certificate delayed or denied. In some cases, denial is unavoidable due to the risks associated with a mariner's medical condition. In many cases, however, the denial could have been avoided if the mariner had employed some simple strategies during the application process.

better position to monitor your conditions and advise you of therapeutic options that will promote your fitness for near- and long-term certification.

For example, if you are diabetic and your medical provider understands that you hold a safety-sensitive credential, he or she may be able to offer tailored guidance on treatment options that can help you better control your blood sugar, help you prevent episodes of hypoglycemia (low blood sugar), and help you to reduce your risk of developing long-term complications that may eventually lead to the loss of your career.

Familiarize yourself with NVIC 04-08. Take time to read the guidance provided in NVIC 04-08 related to each of your medical conditions and medications. This will give you an understanding of how your conditions will be reviewed during the medical evaluation process. The tables in enclosure 3 of this NVIC tell you what types of information should be submitted for each condition that you have. Enclosure 4 provides information that should be submitted related to any medications used.

In many cases, the medical certificate application process is significantly delayed or denied because the applicant has not provided information that is sufficient or appropriate to demonstrate that his or her condition will not pose a risk to the public or maritime safety. Often, the mariner applicant has not even submitted basic information on his or her condition, such as a detailed report from their treating provider. While the Coast Guard may allow mariner applicants additional time and opportunity to submit recommended evaluation data, this can significantly delay processing.



Photo by dslaven/Shutterstock.com.

Strategies to Improve the Medical Certificate Application Experience

Inform your medical provider of your profession. This is critical to the processes of obtaining and maintaining medical certification. You should advise any and all of your medical providers that you hold (or will be attempting to obtain) a safety-sensitive credential. By making sure that your providers are adequately informed, you put them in a

Regulatory Standards: Medical Certificates, Waivers, and Evaluations

The Medical Certificate

Medical certificates are issued to applicants who are found qualified as to medical and physical fitness. The qualifications for mariner medical and physical fitness are contained in Title 46 of the Code of Federal Regulations (CFR), Part 10, Subpart C. They include hearing and vision standards and require that the applicant have no conditions that pose a significant risk of sudden incapacitation or debilitating complication. They also require identification of medications that may impair cognitive ability, judgment, or reaction time. Medical certificates may be denied when the Coast Guard determines that a mariner's medical condition(s) or medication(s) pose too great a risk to public safety.

Additional information on medical conditions that might pose a safety risk, and are therefore subject to further medical

review, is available at https://www.uscg.mil/hq/cg5/nvic/pdf/2008/NVIC_04-08.pdf.

Medical Waivers

Mariners whose medical or physical condition does not meet the standard for qualification can be considered for issuance of a medical waiver in accordance with Title 46 CFR 10.303. Medical waivers may be granted when the Coast Guard determines, to its satisfaction, that there are extenuating circumstances that reduce the risks associated with the condition or medication. The waiver may limit the duration of the medical certificate, and/or may contain other limitations and provisions to which the mariner must adhere.

The Medical Evaluation

In determining whether a mariner's medical condition or medication meets the medical and physical standards, or is

suitable for a medical waiver, the Coast Guard will review the information that the mariner has submitted with their application for a medical certificate. Enclosure 3 to NVIC 04-08 provides examples of the types of evaluation data that the Coast Guard requests to review in making the qualification determination. Additionally, enclosures 4, 7, and 8 describe specific criteria required for waiver consideration for certain medications, implantable cardioverter defibrillators, and seizure disorders, respectively.

If the Coast Guard evaluation identifies a condition or medication that is likely to pose a significant risk, yet the mariner applicant does not provide sufficient information for the agency to determine mitigating factors, then it is likely that no waiver will be granted and the application will be denied.

Share the medical NVIC with your medical providers.

Provide them the link to the NVIC or bring in the sections that apply to your medical condition(s). By reviewing the guidance, your providers will be aware of the degree of detail that they should provide in their written assessment. Additionally, this will enable your providers to advise you specifically for medical certification purposes on the types of medical testing that would be most appropriate for documenting the stability and/or risks associated with your particular condition. In cases where the guidance recommends specialist evaluation, the treating providers can assist the mariner in obtaining the necessary information or specialty referrals in a timely manner.

Make sure that your medical certificate application form (CG-719K) is filled out properly and completely.

An incomplete application will not be processed. Please review the medical certificate application to make sure that you have filled out all areas that request information of you or that request your signature. Additionally, before you leave your medical provider's office, make sure that your provider has filled out all sections of the form that require input.

Make sure that you have provided the recommended evaluation data.

At a minimum, you should submit a detailed

assessment from your treating provider; it should address all points requested of the provider assessment identified in the table of recommended evaluation data. If medical test results were requested, you should submit that information, as well. If you have already had testing in the past and/or if your treating provider does not feel that any further testing is necessary, then ask your provider to document this recommendation in the response to the Coast Guard.

If you receive a request for additional information, promptly share the letter with your medical provider.

Please do not try to paraphrase the contents of the letter or otherwise distill the information in the letter—it often leads to costly miscommunication. Without knowledge of the full contents of the additional information letter, the provider may end up ordering a test or specialty consultation that is not the most appropriate for you in terms of demonstrating the safety and stability of your medical condition.

Take the letter to your provider along with a copy of the guidance in NVIC 04-08. That way, you can review these documents together to discuss whether your condition is appropriate for a safety-sensitive credential and then develop a plan for obtaining and providing the necessary information.



Medication Safety Warning



Photo by David Smart/Shutterstock.com.

Did you know that the Coast Guard issued an important safety warning regarding mariner medication use in April 2016? It is contained in Change-2 to the Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials, Navigation and Vessel Inspection Circular 04-08. The warning reads as follows:

Certain medications, whether prescription or over-the-counter, have known impairing effects and their labels warn about risk of drowsiness and caution against use while driving or operating hazardous machinery.

... In the interest of safety of life and property at sea, the Coast Guard views shipboard life and the attendant shipboard duties that can arise without warning as safety sensitive duties that are analogous to operating hazardous machinery. As such:

1. *Mariners are advised to discuss all medication use with their treating providers and to inform them of the safety sensitive nature of their credential; and*
2. *Mariners are cautioned against acting under the authority of their credential while under the influence of medications that:*
 - a. *can cause drowsiness, or*
 - b. *can impair cognitive ability, judgment or reaction time, or*
 - c. *carry warnings that caution against driving or operating heavy machinery.*
3. *Mariners are advised that they are considered to be acting under the authority of the credential, for the purposes of this NVIC, anytime they are aboard a vessel in a situation to which 46 CFR 5.57(a) applies, even when off-watch or while asleep, or any time they are subject to recall for duty or emergency response.*

Maintain regular care and follow-up with your treating provider. Regular visits to your provider allow for routine health maintenance measures. This enables you and your provider to become aware of any medical conditions or complications early enough that they may be treated and stabilized before you are due to renew your medical certificate.

In Sum

The process of applying for a medical certificate can sometimes be quite complex, particularly for those whose medical conditions may pose a risk to safety. Applying these strategies may go a long way toward helping that process go more smoothly.

About the author:

Dr. Buggs is a graduate of the Massachusetts Institute of Technology and the University of Virginia School of Medicine. She is currently a candidate for a Master of Public Health Degree from the George Washington University School of Public Health. Dr. Buggs completed her residency in emergency medicine at Brooke Army Medical Center and served as a military physician for ten years. After leaving the military, her practice included occupational medicine and community medicine.

For more information:

If you have additional questions during the application process, reach out to the National Maritime Center. Help desk personnel can be reached by phone at 888-427-5662, or via chat on the website at <https://www.uscg.mil/nmc/>.

The Future of Managing Fatigue Risk

Updating IMO guidelines.

by Ms. DAWN M. GRAY
*Office of Design and Engineering Standards
 Human Element and Ship Design Division
 U.S. Coast Guard*

It has been more than 15 years since the International Maritime Organization (IMO) Maritime Safety Committee (MSC) approved the IMO guidelines on fatigue mitigation and management (annex to MSC/Cir. 1014). These guidelines were developed using existing information to provide practical guidance on human fatigue for all stakeholders who have a direct impact on vessel safety.

The MSC developed nine modules and an appendix of fatigue-related documentation to help stakeholders better understand and manage fatigue (see Table 1). The self-contained module structure was intended to allow new modules directed to other interested stakeholders who may not have been initially addressed. Further, these guidelines provided mariners with an important introduction to understanding and managing fatigue-related issues regularly faced in the dynamic 24-hour environment in which they operate.

Update Proposal and Progress

During its 94th session in the fall of 2014, Australia and others submitted a proposal for the revision to MSC/Cir. 1014, which the MSC considered. The committee agreed to include this unplanned output in the agenda and assigned the subcommittee on Human Element, Training, and Watchkeeping (HTW) to coordinate the revision. The working rules provided for the update were to:

- take a risk-based approach,
- update the fatigue science,

- reduce redundancy between the modules,
- provide flexibility regarding fatigue management methods, and
- provide practical tools for fatigue management.

To accomplish this task, the HTW subcommittee established a working group during its third session in the winter of 2015/2016, and they established a correspondence group under Australia’s coordination to progress the revision work intersessionally. The U.S. Coast Guard was excited to be a

Table 1. IMO Fatigue Guidelines: Comparison of current and proposed module structure.

Current	Proposed Revision
Module 1 Fatigue	Module 1 Fatigue Causes and Consequences
Module 2 Fatigue and the Rating	Module 2 Fatigue and the Company
Module 3 Fatigue and the Ship’s Officer	Module 3 Fatigue and the Seafarer
Module 4 Fatigue and the Master	Module 4 Fatigue Awareness and Training
Module 5 Fatigue and the Training Institution and Management Personnel in charge of Training	Module 5 Fatigue and the Ship Designer
Module 6 Shipboard Fatigue and the Owner/Operator/Manager	Module 6 Fatigue and the Administration and Port State Authorities
Module 7 Shipboard Fatigue and the Naval Architect/Ship Designer	Appendix
Module 8 Fatigue and the Maritime Pilot	
Module 9 Fatigue and Tugboat Personnel	
Appendix	



member of this correspondence group and leveraged the Merchant Marine Personnel Advisory Committee (MER-PAC) to inform the U.S. position to accurately represent the U.S. maritime industry at IMO.

At the fourth session of the HTW subcommittee, the U.S. worked to incorporate the inputs provided by the MERPAC fatigue working group into the new modules. Though a formal correspondence group was not established during this meeting of the subcommittee, the U.S. Coast Guard will continue to work intersessionally with the MERPAC fatigue working group to identify areas of the guidelines needing further refinement.

MERPAC Working Group

In the spring of 2015, MERPAC established a fatigue working group to support the effort. This group reviewed recent sleep research from the tug/towboat/barge industry, then worked with one of the researchers to include relevant

aspects of the findings as well as recommendations into the update of the IMO guidelines. MERPAC fatigue working group meetings are open to the public, and all stakeholders are encouraged to attend and provide input.

The dedication of the MERPAC fatigue working group has been a valuable asset to the U.S. Coast Guard, as it helped to form the U.S. position going into the fourth session of the IMO Subcommittee on Human Element, Training, and Watchkeeping in February 2017; and will continue to be a valuable asset going into the fifth session subcommittee in July 2018.

About the author:

Ms. Dawn M. Gray has been serving the U.S. Coast Guard since 2011. She manages human factors considerations in policy, regulation, and standards. Previously, she provided human factors oversight and support for projects across the Coast Guard fleet. Ms. Gray has an M.A. in human factors and applied cognition, and is a certified human factors professional.

For more information:

Find further information on MERPAC and fatigue working group meetings on the Coast Guard's internet website homeport at <https://homeport.uscg.mil>.

Understanding Charcoal

by LCDR JULIE BLANCHFIELD
Chemical Engineer
Hazardous Materials Standards Division
U.S. Coast Guard Headquarters

What is it?

Charcoal is carbon and carbon ashes and generally a pure element, depending on the level of impurities. Charcoal is fairly porous and is used as a filter. Hydrocarbons and other organic chemicals are attracted to carbon, aiding the substance's filtration or cleaning properties.

Charcoal is sometimes shipped as activated carbon (also referred to as "activated charcoal"), depending on its state. Activated carbon/charcoal is more porous because oxygen was added during the process in which it was made. This enhances the substance's surface area and so enhances its filtration functionality. There are no differences in hazards when shipping activated charcoal versus charcoal, but there are minor differences in the way it is named or packaged depending on whether it is shipped domestically or internationally.

Why should I care?

► Shipping Concerns

Charcoal and activated carbon are shipped in containerized cargo units. U.S. transportation regulations and the International Maritime Dangerous Goods Code define charcoal briquettes and activated carbon as a hazard class 4.2 (spontaneously combustible material) and as a packing group III. It is authorized to be stored above or below decks, but should be kept as cool as possible.

► Fire, Explosion, or Reactivity Concerns

The primary concern in transporting the material is its potential to spontaneously combust; quantities of this material stored together may do so due to natural friction or heat. Air may cause the material to ignite, and adding water can exacerbate this spontaneity.

If a small spill occurs, the material can be placed in a small waste disposal container. Larger spills may require protection such as dust masks and other protective equipment.

Large spills, especially into warm environments, can create a fire hazard. Once contained, ignition sources should

be cleared from the area and the substance covered with wet dirt or sand. Release into water is less of a concern (though should always be avoided), as the substance will sink.

► Health Concerns

In the case of a spill or accidental contact, the main health hazard associated with charcoal or activated carbon is the inhaling of dust or ashes. Chronic inhalation can cause inflammation and damage to the lungs.

What is the Coast Guard doing about it?

Charcoal is regulated as a hazardous material domestically under 49 CFR 172.101 and internationally under the International Maritime Dangerous Goods Code. Any person who offers a hazardous material for transportation via vessel must declare this on their shipping papers. The specific requirements on hazardous materials shipping and declarations are found in those sections of the regulations.

The U.S. Coast Guard is the authority that inspects shipping papers and hazardous materials declarations forms. Hazardous materials, including charcoal, carried in containers by sea are subject to inspection of the cargo, condition and markings of the container, and the completeness of the paperwork. These inspections are carried out by Coast Guard container inspectors assigned to local port areas. They have the authority to issue penalties or stop the carriage of the cargo if there is an identified safety issue.

About the author:

LCDR Julie Blanchfield is a chemical engineer in the Hazardous Materials Standards Division at U.S. Coast Guard headquarters, where she develops domestic and international regulations for the safe marine transport of hazardous materials.

References:

General Carbon Corporation, "Facts About Activated Carbon," 2016.
ScienceLab, "MSDS for Charcoal, Activated," 2005.

Nautical Engineering Queries

Prepared by NMC Engineering Examination Team

Q

uestions

1. What practice could potentially damage a multimeter?
 - A. placing the test leads across a voltage source to measure voltage while in the resistance mode
 - B. placing the test leads in series with the load of a circuit to measure current while in the voltmeter mode
 - C. placing the test leads across a de-energized and isolated resistance while in the ammeter mode
 - D. placing the test leads across a de-energized and isolated resistance to measure resistance while in the voltmeter mode

2. When “reset” action is added to proportional action, the proportional action _____.
 - A. aids the reset action during decreasing error transients
 - B. aids the reset action during increasing error transients
 - C. opposes the reset action during increasing error transients
 - D. and reset action are completely independent of one another in the controller operation

3. Fuel oil penetration into the cylinder of a diesel engine is _____.
 - A. dependent on air turbulence
 - B. reduced by finer atomization
 - C. increased by finer atomization
 - D. nonexistent in the precombustion chamber

4. When checking the level of a volatile liquid in a tank on the weather deck of a tank vessel, you should position yourself _____.
 - A. on the windward side of the opening
 - B. on the leeward side of the opening
 - C. at right angles to the wind
 - D. so that the obstruction of your body will protect you from the fumes

A banner for 'Nautical Deck Queries' featuring a sextant on the left, a radar display in the center, and coiled rope on the right. The title 'Nautical Deck Queries' is written in a large, white, stylized font. Below it, in a smaller white font, is 'Prepared by NMC Deck Examination Team'. On the far right, a large white letter 'Q' is followed by the word 'uestions' in a smaller, italicized font.

Nautical Deck Queries

Prepared by NMC Deck Examination Team

Q uestions

1. **BOTH INTERNATIONAL AND INLAND:** Which vessel would exhibit sidelights when underway and not making way?
 - A. a vessel engaged in dredging
 - B. a pilot vessel
 - C. a vessel trawling
 - D. a vessel not under command

2. Which knot reduces the strength of a line by the LEAST amount?
 - A. bowline
 - B. sheet bend
 - C. square knot
 - D. Carrick bend

3. If your vessel must pass through a draw during a scheduled closure period, what signal should you sound to request the opening of the draw?
 - A. three short blasts
 - B. five short blasts
 - C. one prolonged blast followed by three short blasts
 - D. one prolonged blast followed by one short blast

4. Which statement about a vessel's stability while dry-docking is TRUE?
 - A. Every ton of weight bearing on the blocks acts as if a ton of weight was removed at the keel level.
 - B. As the dock begins to support the weight of the vessel, stability calculations are based on the ship and dock as a single unit.
 - C. When the ship touches the blocks, the beam for stability purposes increases to the beam of the dry-dock.
 - D. The stability of the vessel increases as a dock is pumped out, due to the support of the keel blocks.

1. *Note: While some multimeters (particularly digital) may be forgiving when conducting measurements with the function selector switch in the “wrong” position for the test being performed, some multimeters can potentially be damaged by such practice. The internal impedance of the meter must be properly configured for the test being performed to obtain accurate readings and to protect the meter. If the internal impedance is too low for the test being performed, the resulting current may damage the meter. If the internal impedance is too high for the test being performed, although the meter reading would be inaccurate, the meter itself would not be endangered.*
 - A. placing the test leads across a voltage source to measure voltage while in the resistance mode **Correct answer.** When attempting to measure voltage, the internal meter impedance should be configured to be high. By placing the function selector switch in the resistance mode by mistake, the internal impedance would actually be configured to be very low. This would result in excessively high current, potentially damaging the meter. NEVER place the meter leads across an external source of voltage with the meter function selector switch in the resistance mode.
 - B. placing the test leads in series with the load of a circuit to measure current while in the voltmeter mode **Incorrect answer.** When attempting to measure current by placing the meter in series with a load, the meter internal impedance should be configured to be very low, with most of the current flowing through meter internal shunts. With the function selector switch in the voltage mode by mistake, the internal impedance would actually be configured to be relatively high. This would result in zero current since no external voltage would be applied across the meter leads. While an inaccurate reading is produced, the meter itself will not be damaged.
 - C. placing the test leads across a de-energized and isolated resistance while in the ammeter mode **Incorrect answer.** When attempting to measure the resistance of a de-energized and isolated load, the meter internal impedance should be configured to be extremely low. With the function selector switch in the current measuring mode by mistake, the internal impedance is actually configured to be extremely low due to internal shunts. This would still result in zero current since no internal battery voltage would be applied across the meter leads. While an inaccurate reading is produced, the meter itself will not be damaged.
 - D. placing the test leads across a de-energized and isolated resistance to measure resistance while in the voltmeter mode **Incorrect answer.** When attempting to measure the resistance of a de-energized and isolated load, the meter internal impedance should be configured to be extremely low. With the function selector switch in the voltage mode by mistake, the internal impedance would actually be configured to be relatively high. This would still result in zero current, since no internal battery voltage would be applied across the meter leads. While an inaccurate reading is produced, the meter itself will not be damaged.

2. *Note: Proportional action is the application of a corrective force proportional to the amount of error. While inherently stable, this produces permanent offset proportional to the load. Integral (reset) action is the application of a restoring force that is proportional to the sum of all past errors (multiplied by time) in an effort to reduce the steady-state error to zero (removing offset). The greater the error, the greater is the restoring force, which tends to produce overshoot. Derivative action is an arresting force that is proportional to the rate of change of the error and acts to prevent the oscillations associated with overshoot.*
 - A. aids the reset action during decreasing error transients **Incorrect answer.** With a decreasing error, the corrective force associated with proportional action and the restoring force associated with reset action will oppose each other, not aid each other.
 - B. aids the reset action during increasing error transients **Correct answer.** With an increasing error, the corrective force associated with proportional action and the restoring force associated with reset action will aid each other.
 - C. opposes the reset action during increasing error transients **Incorrect answer.** With an increasing error, the corrective force associated with proportional action and the restoring force associated with reset action will aid each other, not oppose each other.
 - D. and reset action are completely independent of one another in the controller operation **Incorrect answer.** Proportional action and reset action work in concert with each other for stable control where the steady-state error is zero (although overshoot and associated oscillations may occur).

3. *Note: Fuel penetration into the cylinder of a diesel engine is dependent upon the characteristics of the spray as a function of injection pressure, fuel properties, and nozzle tip geometry. The fuel should penetrate far enough to ensure good distribution, but not so far as to impinge upon surrounding surfaces.*
 - A. dependent on air turbulence **Incorrect answer.** Although turbulence has a great effect on air/fuel mixing, it does not impact fuel oil penetration into the cylinder.
 - B. reduced by finer atomization **Correct answer.** The finer the spray of fuel into the cylinder, the smaller the fuel droplet size becomes. This, in turn, will cause the fuel to evaporate more quickly and penetrate into the cylinder a lesser distance before evaporation is complete.
 - C. increased by finer atomization **Incorrect answer.** The coarser the spray of fuel into the cylinder, the larger the fuel droplet size becomes. This, in turn, will cause the fuel to evaporate more slowly and penetrate into the cylinder a greater distance before evaporation is complete.
 - D. nonexistent in the precombustion chamber **Incorrect answer.** With indirect injection, the fuel must penetrate into the precombustion chamber, where combustion begins with a surplus of fuel, then spreads to the main chamber, where there is a surplus of air. Penetration is existent regardless of the combustion chamber design.

continued on next page

1. A. a vessel engaged in dredging Incorrect answer.
 B. a pilot vessel **Correct answer.** Reference INTERNATIONAL & INLAND Rule 29
 Rule 29 states: “(a) A vessel engaged on pilotage duty shall exhibit:
 (i) at or near the masthead, two all-round lights in a vertical line, the upper being white and the lower red;
 (ii) when underway, in addition, sidelights and a sternlight”
- C. a vessel trawling Incorrect answer.
 D. a vessel not under command Incorrect answer.
-
2. A. bowline **Correct answer.** Reference *Chapman Piloting & Seamanship*, Charles B. Husick, 66th Edition, page 789, table 23-2
 The bowline knot retains 67–75% of the strength of the line.
- B. sheet bend Incorrect answer.
 C. square knot Incorrect answer.
 D. Carrick bend Incorrect answer.
-
3. A. three short blasts Incorrect answer.
 B. five short blasts **Correct answer.** Reference 33 CFR 117.15(a)(3)
 “For vessels required to be passed through a draw during a scheduled closure period, the sound signal to request the opening of the draw during that period is five short blasts sounded in rapid succession.”
- C. one prolonged blast followed by three short blasts Incorrect answer.
 D. one prolonged blast followed by one short blast Incorrect answer.
-
4. A. Every ton of weight bearing on the blocks acts as if a ton of weight was removed at the keel level. **Correct answer.** Reference *Modern Ships Elements of Their Design, Construction, and Operation*, John H. La Dage, 2nd Edition, page 244.
 As the vessel begins to settle on the blocks, the force acting down on the blocks has the net effect of removing weight from the keel. This causes the center of gravity to rise, and if it rises above the metacenter, the vessel may start to list.
- B. As the dock begins to support the weight of the vessel, stability calculations are based on the ship and dock as a single unit. Incorrect answer.
 C. When the ship touches the blocks, the beam for stability purposes increases to the beam of the dry-dock. Incorrect answer.
 D. The stability of the vessel increases as a dock is pumped out, due to the support of the keel blocks. Incorrect answer.

Engineering Queries Answers (continued)

4. Note: When checking ullages on tanks holding volatile liquids on the weather deck, personnel should avoid inhaling the vapors from the tank openings by standing at right angles to the direction of the wind.
- A. on the windward side of the opening Incorrect answer. If you stand on the windward side of the opening (upwind), your body may cause a back-draft, thus subjecting yourself to inhalation of the fumes.
 B. on the leeward side of the opening Incorrect answer. If you stand on the leeward side of the opening (downwind), you will be in the direct path of the escaping vapors, thus subjecting yourself to inhalation of the fumes.
 C. at right angles to the wind **Correct answer.** If you stand on the side of the opening that positions you at right angles to the wind, you will minimize your risk of inhaling fumes.
 D. so that the obstruction of your body will protect you from the fumes Incorrect answer. If you stand on the side of the opening that uses your body as an obstruction to the wind, this is standing on the windward side of the opening, causing a possible back-draft, thus subjecting yourself to inhalation of the fumes.

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