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Marine Safety Engineering

A Note From The Director

Greetings and welcome to the December 2011 edition of the Marine Safety Engineering Newsletter!

As we look back on 2011, it has been a very good year for Marine Safety Engineers. Understandably, we have focused immense interest in the offshore arena and we're taking on some extremely interesting, difficult, and technically challenging issues. One example is the development of standards for dynamic positioning and blowout preventer functions, and how they relate and are integrated with emergency disconnect systems.

The increased focus on Arctic drilling is also providing new opportunities and challenges for Marine Safety Engineers. We need to ensure drilling, support and response vessels meet the safety, environmental and operational requirements needed for the Arctic. Much of this will be done in partnership with our sister agencies and in that vein, we are fortunate that RADM (ret.) James Watson (a Marine Safety Engineer) has taken the helm at the Bureau of Safety and Environmental Enforcement (BSEE). We look forward to a close and cooperative relationship with BSEE and RADM Watson.

This issue highlights another technology that is becoming more important every day, and that is the increased use of liquefied natural gas (LNG). Whereas, we previously considered LNG as a cargo, new MARPOL regulations for reduced emissions are now making it an attractive fuel source. It is extremely clean burning and is much lower cost than similarly clean diesel fuel. Marine Safety Engineers are leading the charge in establishing the appropriate safety standards needed for LNG fueled vessels, which not only includes the vessels themselves, but also bunkering facilities and waterways risk management.

I would like to congratulate the Marine Safety Engineers selected for promotion in PY 11; your promotions are well-deserved and a testament to the importance of the CG-OAP 16 sub-specialty. I also congratulate those members recently selected for Marine Safety Engineering postgraduate training, and look forward to having you join the ranks of our community.

Finally, I wish you a wonderful holiday season and continued success in the New Year. Make sure to take time to enjoy your family and friends during this time of year.

Regards,

Jeff Lantz,
Director of Commercial Regulations and Standards

USCG And PVA Sign 5A Policy Charter

Director of Prevention Policy Rear Admiral Jim Watson, and Passenger Vessel Association (PVA) President Captain Jay Spence, are pictured signing the USCG/PVA 5A Policy Working Group Charter on November 11, 2011, in Boston. The working group, consisting of designated CG-5214 and MSC staff and PVA members, will seek to facilitate assessment, potential refinement, and implementation of the Coast Guard policy for Very Low Fire Load (5A) spaces on aluminum small passenger vessels. The policy, which became effective in October 2011 in NVIC 9-97 Change 1 (Guide to Structural Fire Protection) requires that the 5A relaxation of Subchapter K insulation requirements for boundaries between areas of refuge, embarkation stations and external escape routes be supported by a performance-based engineering analysis substantiating the lesser protection. The work of the group will include computational fire dynamics simulations, fire testing of characteristic furnishings, and development of checklist-style simplified parameters for evaluating compliance.

RADM Jim Watson and PVA President Jay Spence

MSC "Taking the Game to the Field": LNG Containment System Testing

by LT Kirt Linegar

LT Chris O'Neil (left) and LT Kirt Linegar inside an LNG storage tank on the LNG carrier MATTHEW

On August 22, 2011, engineers from the Marine Safety Center traveled to the Navantia Shipyard in Ferrol, Spain to observe testing and repairs to the cargo tanks on the liquefied natural gas (LNG) carrier MATTHEW. The MATTHEW is one of three LNG ships built in the late 1970s in Newport News, VA. These ships were equipped with a membrane-type containment system designed for cryogenic LNG cooled to minus 263 degrees Fahrenheit. At the time, the GTT (formerly Technigaz) Mark I system represented the state-of-the-art in LNG containment. However, long-term maintenance and inspection of the system present significant challenges.

Membrane containment systems are designed with both a primary and a secondary barrier and thick balsa wood insulation to protect the hull from extreme temperatures. When cryogenic LNG comes into contact with steel it can significantly degrade the structural integrity of the hull of a vessel. The secondary barrier (marine-grade plywood) poses challenges for both technicians and Coast Guard marine inspectors given its inaccessible location between the stainless steel primary barrier and the balsa wood insulation.

Previously, the only method to verify the integrity of the secondary barrier involved removal of large sections of the primary barrier to permit visual inspection. This unguided destructive method was extremely time consuming and expensive. Now, GTT believes they have a more effective solution for secondary barrier testing. The new method, called Thermal Assessment of Membrane Integrity (TAMI), uses thermal imaging to detect cold nitrogen, pumped into the space between the primary and secondary barriers. Leaks in the secondary barrier can be identified using the thermal imaging technique to develop a 3D map of "cold spots." GTT technicians then focus their investigation on potential problem areas.

The TAMI test conducted on the MATTHEW revealed a number of cold spots, indicating several potential secondary barrier failures. LT Linegar and LT O'Neil witnessed the removal of the primary barrier in these areas of the cargo tank and confirmed that, in each case, the secondary barrier was indeed damaged. After completing repairs on the secondary barrier of each cargo tank, GTT will perform a second TAMI test to verify the repairs, ensuring this 32-year-old vessel is safe to continue operating in U.S. waters.

Reducing Air Emissions: Going Green

Throughout the next decade, increasingly more stringent air emission limits will be imposed on maritime shipping. Specifically, these mandates are aimed at reducing the emission of nitrogen oxide (NOx) and sulfur oxide (SOx), both by-products of combustion that are detrimental to health and the environment. The strictest limits will apply in Emission Control Areas (ECAs) where the NOx emission rate will be reduced by 80% through internal or external engine controls. Furthermore, the SOx emission rate will be lowered by reducing the sulfur content in fuel from 4.5% to 0.5% by weight. The implementation of these requirements is right around the corner – the North American ECA will enter into force on August 1, 2012.

There are several different avenues for compliance, including switching to low-sulfur fuel or installing exhaust gas after-treatment systems. Several companies are using novel engine arrangements to meet the emission requirements. Foss Maritime and Hornblower Cruises & Events both operate advanced diesel electric hybrid vessels. These hybrid vessels have realized 20-25% savings in fuel consumption and maintenance costs; however, hybrid technology is currently too cost-prohibitive to have mass appeal in the maritime industry.

Foss' Big Green Tug: The CAROLYN DOROTHY

Natural Gas-Fueled Vessels: Coming Soon

by LT Nick Woessner

The use of natural gas as fuel onboard ships is an attractive alternative for meeting current and future air emission requirements. Consequently, companies have requested Coast Guard approval on several design proposals. Due to the intrinsic properties of LNG, the Coast Guard conducts a systematic review of each proposal to ensure that the design offers an equivalent level of safety to that of a traditional diesel fuel oil system.

LT Woessner and Tony Teo of DNV standing next to the IMO type C LNG tank on the Tide Sjø ferry

While gas-fueled ships (GFS) are not common within U.S. waters, LNG has successfully been used as fuel for decades. More recently, GFS have been operating within Norway's jurisdiction since 2000. In April 2011, Mr. Timothy Meyers and LT Nick Woessner from COMDT (CG-521) went to Norway to assess the design and operational requirements of existing applications of GFS. They met with Det Norske Veritas engineers, GFS owners and operators, as well as visited two GFS passenger ferries and an offshore supply vessel. The trip validated that GFS, when designed correctly, are a viable solution for complying with stringent air emission standards.

The data collected from this trip provided an enhanced understanding of GFS design and directly supported case-by-case review of recent design proposals. An equivalent level of safety to that of conventionally fueled vessels has been established for engineers that incorporated the International Maritime Organization's Guidelines for Natural Gas Engine installations MSC.285(86) as a base standard into their proposal. Examples of recent acceptance include a domestic passenger ferry application by Washington State Ferries, as well as a retrofit design for a domestic RO-RO vessel by TOTE, also in Washington State.

Marine Safety Engineers from CG-521 have taken a lead role in implementing design standards for the use of GFS technology. This is yet another example of the Coast Guard's commitment to facilitating new technologies in the commercial maritime industry.

Viking Energy Offshore Supply Vessel: Four dual fuel (LNG or Diesel) generators provide propulsion power

Drilling for Improvements in Offshore Safety

by LCDR Marc Montemerlo

Following the Deepwater Horizon (DWH) incident, Congress, industry and several investigative reports all suggested that the United States research alternative regulatory approaches to see if there was a better method to enhance offshore safety. Over the past year, the Office of Design and Engineering Standards (CG-521) has been working with foreign offshore oil/gas regulators -- The Health and Safety Executive (HSE) in the United Kingdom (UK) and the Petroleum Safety Administration (PSA) in Norway, with a majority of time being spent learning the UK's "Safety Case" method.

The "Safety Case" method is based on the theory that because oil companies are the ones performing drilling and production operations, thus creating the risks, they should be the ones responsible for ensuring the safety of each worker and the surrounding environment. Owners and operators must then demonstrate how they reduce these risks by submitting a "Safety Case" to the HSE that contains highly detailed engineering system plans, safety management systems and thorough risk analyses demonstrating compliance with the regulators' broad goal-based regulations. This approach differs from the United States' in several fundamental ways: it is goal based, it is implemented by a single offshore regulator, it employs different compliance and enforcement techniques, and finally, it requires a huge increase in inspector knowledge/training. All of these differences make the "Safety Case" method very costly to implement, a problem handled in the UK through a cost-recovery system that charges oil companies substantial fees to perform inspections and review Safety Cases.

While it has not yet been determined if the U.S. will change its regulatory approach to something comparable to the "Safety Case" method, CG-521 and representatives from the Marine Safety Center continue to research and develop improvements in offshore safety. Through new partnerships with the new Bureau of Safety and Environmental Enforcement (BSEE), participation on the International Regulators Forum and various special interest panels like the Ocean Energy Safety Advisory Committee, the Coast Guard remains dedicated to the continued improvement of offshore regulatory safety.

Breaking the Ice: Marine Safety Engineering in the Arctic

by LCDR Bryson Spangler

Marine Safety Engineers continually find themselves at the forefront of controversial and sensitive issues facing the Coast Guard. One such issue is the role of the United States in the development of standards to ensure safe and environmentally friendly commercial operations in the Arctic.

As part of Shell Oil's effort to obtain drilling permits for the Chukchi and Beaufort Seas off the coast of Alaska, they need to demonstrate the ability to recover oil from a subsea spill. To do this, Shell is designing and constructing an Arctic Containment Vessel (ACV) to capture oil in the event of a blowout. The ACV will capture, process, and offload the oil to an awaiting oil storage vessel or barge. Due to the novel design and aggressive timetable, MSE's are working overtime to establish minimum design and engineering standards to ensure the vessel can safely operate in the harsh Arctic conditions without compromising crew safety or threatening the environment.

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Marine Safety Engineering Class of 2011

Congratulations to the following officers who graduated this year !

Marine Engineering

LCDR Heather Mattern, Naval Postgraduate School

LCDR Catherine Phillips, University of Michigan

LT Tony Cao, University of Michigan

LT Brian Watts, Naval Postgraduate School

LT Meghan Sinclair, University of California-Berkeley

LT Jarred Hinton, University of Michigan

Fire Protection Engineering

LT Bryson Jacobs, University of Maryland

Chemical Engineering

LT Jodi Min, Johns Hopkins University

Marine Engineering Technology

LT Steven Kee, Everett Community College

Marine Safety Engineering Participation in Cadet Design Projects

The Marine Safety Program continues to cultivate professional and academic partnerships with the Coast Guard Academy (CGA). In part, CG-52 and the Marine Safety Center (MSC) are supporting senior design projects which involve commercial vessel design and dynamic positioning systems (DP). These projects are supplementing a variety of new Marine Safety courses, Prevention summer training initiatives, and Marine Safety Engineering internship opportunities, providing direct exposure to the Prevention program.

The commercial vessel design project is a Naval Architecture and Marine Engineering cadet submittal to a competition co-sponsored by MARAD and SNAME. The focus of the effort is to design a marine transport service capable of delivering at least 150 trailers per day from Bridgeport, CT to Jacksonville, FL and return with an equivalent number of trailers. The MSC is providing technical assistance with plan review and design analysis.

The dynamic positioning (DP) system design-build-test project is an Electrical Engineering cadet initiative that will explore issues associated with DP systems found on drilling platforms and commercial vessels. The cadets are working directly with MSC and CG-52 engineers to explore possible modes of failure (e.g.: loss of reference position, loss of motor drive, loss of thruster power, etc.)

The final deliverables of these projects will be presented at the annual CGA Senior Research Symposium in May of 2012. Design reports can be made available upon request.

Breaking the Ice: Marine Safety Engineering in the Arctic (cont.)

Additionally, the Office of Design and Engineering Standards (CG-521) is working with IMO member Nations and non-governmental organizations to develop a Polar Code for commercial shipping applicable to SOLAS ships operating in the Arctic and Antarctic regions. The Code consists of supplemental requirements to SOLAS and MARPOL, will be goal-based, and includes both functional and prescriptive requirements. The Code will ensure vessels operating in Polar waters are adequately designed, built, equipped, and manned to successfully operate in these extreme environments without sacrificing safety or compromising environmental stewardship.

Both of these projects and many others across the Coast Guard are being tracked at Coast Guard Headquarters by the Arctic Initiative Matrix Team. Due to the current domestic and international attention the Arctic is receiving regarding OCS activities, Polar icebreaking, and global warming, the team was established to track Arctic initiatives for the Commandant. Both ADM Papp and VADM Salerno are briefed weekly on the status of all projects. As you can see, MSE's truly are at the forefront of a number of high profile projects with global impacts.

Where Are They Now? Techies in the Field

by LCDR Catherine Phillips

In this edition, we'll visit with CDR Benjamin Hawkins, Commanding Officer of Marine Safety Unit Valdez.

CDR Benjamin Hawkins, Commanding Officer of Marine Safety Unit Valdez, with Senator Lisa Murkowski of Alaska

MSEN: Congratulations on your current assignment! Can you provide us with a snapshot of your career thus far and how it led to your current position?

BH: My first assignment was as a Student Engineer aboard the CGC RELIANCE. From RELIANCE I went to the University of Michigan where I earned a Master's degree in Naval Architecture & Marine Engineering. Afterwards, I served at the Marine Safety Center in the Major Vessel Branch of the Hull Division. This was my first real exposure to Marine Safety, and I was able to capitalize on the opportunity with plenty of field work alongside Marine Inspectors - overseas and throughout the U.S. Following that I was assigned to Marine Safety Office Paducah, KY, as Chief, Inspection Department, and Senior Investigating Officer. After wrapping up that tour as the XO, I moved on to Activities New York as the Senior Investigating Officer and gained experience leading numerous environmental crimes investigations as well as major casualty investigations like the allision of the Staten Island Ferry ANDREW J. BARBARI. After New York, I served in headquarters as Chief of the Human Element and Ship Design Division where we dealt with a wide variety of concerns including crew endurance, high speed craft, towing vessels, OSVs and Arctic/Antarctic challenges. Now I'm here, CO of Marine Safety Unit Valdez.

MSEN: Quite the colorful career. As a Marine Safety Engineer, can you explain how your degree helped shape your career path?

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Marine Safety Engineering Class of 2014

Congratulations to the following officers who were selected to the Marine Engineering, Fire Protection Engineering and Marine Engineering Technology Class of 2014!

Marine Engineering

LT Jen Doherty, Sector New Orleans

LT Eric Velez, Sector New York

LT John Walsh, Sector New York

LT Kyle Carter, Marine Safety Unit Port Arthur

LTjg Stephanie Waller, Sector New Orleans

ENS Margaret Woodbridge, USCCG POLAR STAR

ENS Thomas Olsen, USCGC POLAR STAR

Fire Protection Engineering

LT Brian Hall, Sector Southeast New England

Chemical Engineering

LT Andrew Murphy, Sector Delaware Bay

Marine Engineering Technology

LT Chad Robuck, Marine Safety Detachment Santa Barbara

Where Are They Now? Techies in the Field (cont.)

BH: Without a doubt, my career has been largely shaped by the combination of my under- and post-graduate degrees in Naval Architecture & Marine Engineering. Because engineering is fundamental and central to the execution of the Marine Safety mission, enormous organizational value is realized with a strong and healthy engineering presence in the Officer Corps. For this reason, my education helped keep my career path very close to my passion for Marine Safety.

MSEN: A common perception among junior officers is that becoming a Marine Safety Engineer restricts you to a narrow career path. Do you agree?

BH: Not at all. Look at past issues of this newsletter to read about the career accomplishments and highlights of many Marine Safety Engineers. While you will see many similarities and parallels, you will also see many opportunities capitalized on solely because of our ability to define problems, assess complexities and devise solutions. Whether talking about engineering, resource management, interagency coordination or strategic planning, our engineering skills are valued throughout the organization. One's career will only be as narrow as one desires it to be.

MSEN: Very interesting. As a student engineer, what drove you towards the Marine Engineering postgraduate program?

BH: From the beginning I was certainly aware there would be opportunities for postgraduate education, but I really didn't appreciate the value of such opportunities. Fortunately, the Engineering Officer on the RELIANCE did, and he invested a lot of effort helping me understand that, as well as the different opportunities available in the naval and marine safety engineering advanced education programs. This just underscores the importance of mentoring our junior officers!

MSEN: Agreed. What advice would you offer to junior officers currently entering the Marine Safety Engineering field?

BH: Aggressively and constantly pursue ongoing professional development - through professional certifications, qualifications and private study. Because the maritime industry is dynamic and constantly pushing the envelope, Marine Safety Engineering offers you the single, greatest engineering opportunity in the Coast Guard. But you're going to have to work hard to establish and maintain your professional credibility as a Marine Safety Engineer who will contribute to our organizational success.

MSEN: Why are Marine Safety Engineers important to the Coast Guard?

BH: That's easy. As I said earlier, engineering is fundamental to the marine safety mission - not to mention others like environmental protection, security, ATON, etc. Everything we do is rooted in various engineering disciplines, and without that foundation it is impossible to execute the mission. This was true under the Steamboat Inspection Service, and it remains true today. Without an engineering nucleus, there is no mission execution.

MSEN: Thank you so much for your time. Any last words of advice?

BH: Never stop learning, and seize new opportunities! This is a great field, working with a dynamic industry, during an exciting period in our history. For those with drive and initiative, it is a great time to be in Marine Safety Engineering!

Chemical Engineering Advanced Education Program

In an effort to increase awareness of the Chemical Engineering Advanced Education Program, LT Beth Newton from CG-5223, along with the Marine and Environmental Science (MES) Department at the Coast Guard Academy, capitalized on an opportunity to speak to cadets. LT Newton prepared a short presentation for MES juniors informing them of post-graduate school requirements, procedures and career tracks available to the marine science and chemical engineering community.

The MES Department and LT Newton wanted to initiate a so-called "preemptive strike" at garnering interest and attention in the Chemical Engineering Advanced Education program, especially because most cadets in the Marine Science Department were not informed of the opportunity until after they graduated.

While this recruiting effort is meant to familiarize MES cadets with the Chemical Engineering postgraduate program, applicants are reminded that Coast Guard chemical engineers have a variety of backgrounds, which provides a wealth of knowledge and diversity in the Hazardous Materials Standards Division at Headquarters, and Marine Safety Center.

LT Beth Newton presenting the Chemical Engineering Program to CGA Cadets

Engineer in the Spotlight: LT Luis Carmona

by LT Chris O'Neil

On August 25, 2011, LT Luis Carmona was presented the 74th Lieutenant Commander William B. Turek Award upon completion of the Marine Inspection Course (MIC) at TRACEN Yorktown. The Turek Award is presented at the end of each MIC class to the graduate, as selected by fellow classmates, who best exemplifies the personal and professional qualities necessary to be a successful Coast Guard Marine Inspector: professionalism, integrity, flexibility, and an overriding concern for the safety of vessel personnel. Previous Turek Award winners have gone on to be some of the most successful and well regarded members of the Prevention Community.

LT Carmona receives the Turek Award at the Marine Inspector Course in Yorktown, VA

LT Carmona was assigned to the Marine Safety Center (MSC) in 2008 after completing a Master of Science degree in Ocean Engineering at Virginia Tech. The professional knowledge and experience gained at MSC while working in the Small Vessel Branch, Tank Vessel and Offshore Division, and on the Salvage Engineering Response Team (SERT) enabled LT Carmona to fill the role of both student and teacher while attending MIC. LT Carmona mentored fellow students in complex naval architecture topics including vessel structures and stability. He ensured that fellow classmates had a clear understanding of the responsibilities of MSC involving the review and approval of the design, construction, repair, and alteration of regulated vessels. He also provided an in-depth presentation detailing the capabilities of the SERT, which provides 24/7 technical support to field commanders during emergent vessel casualty situations. His selection as the Turek Award winner represents his lasting contributions to the MIC curriculum.

The instruction received at MIC is a critical part of any Prevention career. During the five week course, Coast Guard Marine Inspectors receive instruction in basic hull construction and nomenclature, welding qualification procedures, hull inspection and drydock requirements, lifesaving systems, firefighting systems, propulsion and auxiliary systems, electrical systems, stability and subdivision, technical plan review, and occupational safety for inspectors. Traditionally, MIC was only available to personnel assigned to marine inspection field units. However, in early 2011, the course was opened to Marine Safety Engineers assigned to MSC to help them prepare for follow-on tours as marine inspectors. LT Carmona is the third member of MSC to complete the course.

In addition to his work at MSC, LT Carmona is heavily involved in Coast Guard recruiting and outreach initiatives such as the Marine Engineering Post Graduate Program and as the Coast Guard liaison to the Hispanic Association of Colleges and Universities.

If you have any comments about this e-newsletter, or would like to contribute an article to an upcoming edition, please contact LT Al Giordano:

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