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CROWLEY MARITIME

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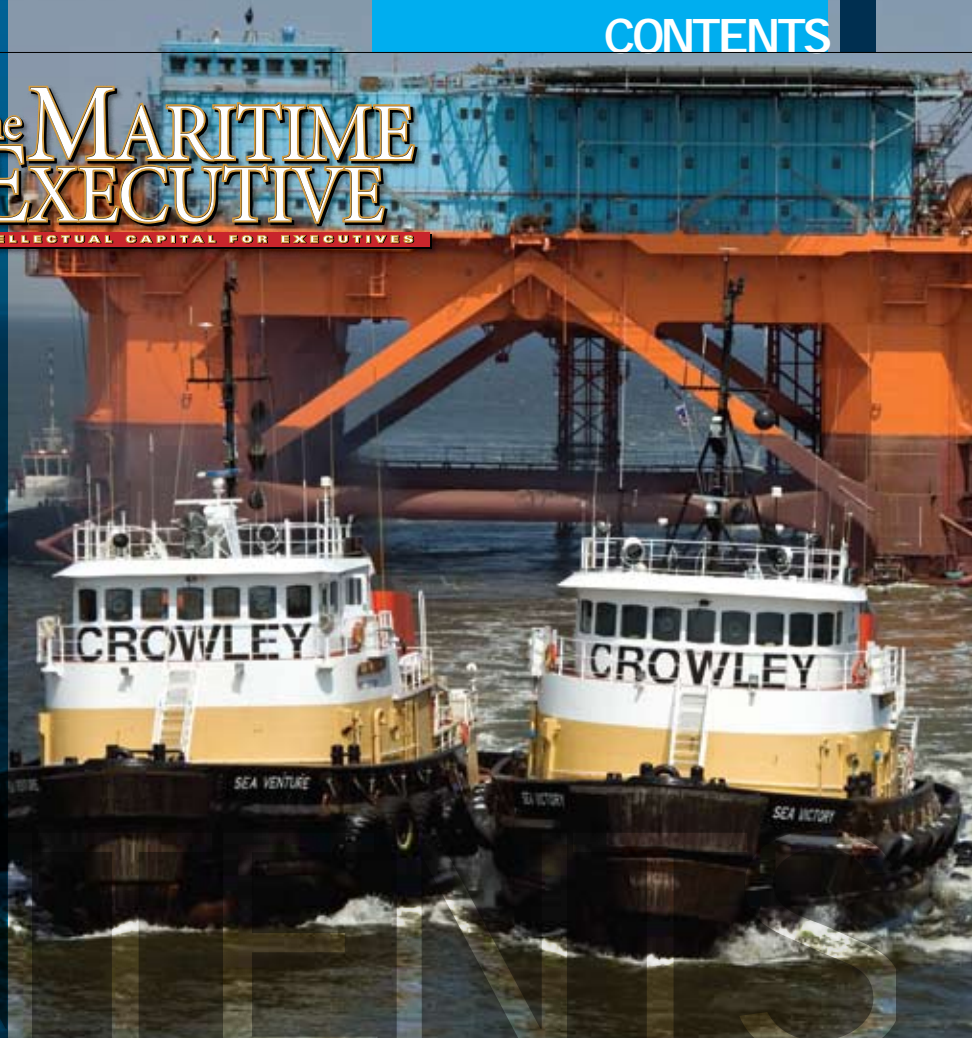
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INVASIVE SPECIES UPDATE: End Game in Sight?

Cape Washington, Marad vessel used for testing.

The Maritime Environmental Resource Center Introduces Meaningful Third-Party Testing and the Credibility to Bring Solutions to the Table

Old Problems: New Initiatives

Tucked away on Maryland's picturesque shores is an initiative that provides test facilities, information, and decision tools to address key environmental issues facing the international maritime industry. Aptly named the Maritime Environmental Resource Center (MERC), the facility's self-described initial focus is "to evaluate the mechanical and biological efficacy, costs and logistical aspects of ballast water treatment systems and to assess the economic impacts of ballast water regulations and management approaches."

If you think you've heard it all before, then this would be an appropriate time to tune in and listen. Unlike endless other government programs and initiatives that have become bogged down in the regulatory and political gauntlet, MERC and its leader, Dr. Mario N. Tamburri, have no skin in the game and no axe to grind. Instead, the Center has just three main objectives:

- » Provide technology developers/vendors with facilities and expertise for pilot-scale and shipboard evaluations of treatment systems and provide agencies with stan-

darized third-party data on system performance;

- » Provide ship builders and shipping lines with information and decision tools to select the most appropriate treatment options for particular sizes and types of vessels used along various shipping routes; and
- » Remove as much uncertainty as possible from emerging markets for treatment systems in order to encourage buyers and sellers to engage with one another and make the necessary investments to accelerate the adoption of treatment technologies.

Real Commitments: Substantial Support

Dr. Tamburri, the Director of MERC, and his Chief Engineer and Program Coordinator, Ross Kanzleiter, are already testing commercially produced technologies on board Maritime Administration vessels and plan to ramp up that schedule markedly in the current year. Tamburri has been involved with invasive species testing, research and policy for more than ten years. Kanzleiter, a U.S. Merchant Marine Academy graduate (and valedictorian), has



Dr. Mario Tamburri, Director of MERC

a Master's of Science in Environmental Process Engineering from Johns Hopkins University.

The pair of scientists has begun to accomplish what no one else before could quite figure out: a way to combine the esoteric world of academia with the hands-on, industrial realities of commercial shipping in a focused effort to bring an end game to the nightmare of invasive species.

MERC is a collaborative effort, supported primarily by the University of Maryland, Maryland Department of Transportation, Maryland Port Administration and the Maritime Administration. About 80 percent of MERC's funding comes from MDOT and the Port Administration, but MARAD and NOAA have also provided resources. With an eye toward the classification societies, which eventually will be involved in the certifications of ballast water treatment systems, MERC has also embarked upon a partnership with ABS. Tamburri says, "We hope to grow that relationship to where we could field-test for them as they look at class approvals, that sort of thing. We do not want to write reports for vendors or answer to them."

Although ballast water treatment testing has been ongoing in the private sector for at least ten years, MERC's program will provide an independent and credible review. Tamburri adds, "We aren't developing the technologies, so we don't have an agenda. We work on a basis that our results will be published, irregardless of the results – good or bad."

Real Work: A Track Record and Much More in the Pipeline

Real Work: A Track Record and Much More in the Pipeline

This year will be a busy one for MERC, which is finishing the testing of MSI's UV filter system and will soon begin similar testing on three other technologies from different sources. MERC's Year 2 (2009) testing will include:

- 1 Completion of MSI (filtration + UV);
- 2 Siemens SiCURE BWMS (filtration + electrochlorination);
- 3 Severn Trent De Nora (filtration + electrochlorination); and
- 4 NEI Treatment Systems (Venturi Oxygen Stripping).

MERC is also planning to test a series of filter systems designed specifically for ballast water. A call for applications will go out in February. What will eventually come out of all this testing is real data. Says Tamburri, "The NEI system was tested on a commercial bulker. We also deal with MARAD very well. And because they are very interested in this is-

sue, they've given us access to their vessels so that we can install the equipment right on board." But beyond its efforts in proving these emerging BWT systems, MERC is also involved in other programs.

Thoroughly familiar with the Coast Guard's two programs to evaluate treatment technologies – the Shipboard Technology Evaluation Program (STEP) and the Environmental Protection Agency's (EPA) Environmental Technology Verification (ETV) program – Tamburri has helped with their testing and, of course, gotten some metrics out of both. Tamburri explains, "The Coast Guard's facility in Key West was set up to establish testing standards and protocols. The data mined there has absolutely helped us in decisions based on what they've learned."

The STEP program is intended to promote the development of effective ballast water treatment technologies by incorporating the approved vessel into an experimental system and offering incentives to vessels for engaging in the development and use of experimental treatment technologies. On the other hand, the EPA's ETV program is not specific to ballast water treatment; therefore it is being used in a partnership with the USCG as a tool — not an approval process — to create and evaluate standardized testing procedures for use in determining if ballast water treatment systems are working effectively. Tamburri understands the value of both programs but candidly asserts, "We take a very different approach. Developing the protocols is fine, but someone needs to step up and start getting things done. We're funded to get these applications on board ships, onto land-based facilities and get the data."

Important Work: Interesting Findings and Preliminary Advice

The performance of treatment technologies in treating ballast water intended for discharge in U.S. waters must be approved by the Coast Guard. Only then can these emerging technologies be used in lieu of ballast water exchange or prior to ballast water discharge. Indeed, Rep. Elijah Cummings, (D-MD), Chairman of the House Transportation and Infrastructure's Subcommittee on Coast Guard and Maritime Transportation, said recently, "Given that ballast water exchange isn't completely effective, I strongly support requiring ships to treat ballast water before releasing it." Nevertheless, anyone foolish enough to install equipment without first obtaining this approval – and it is not yet here – risks flushing as much as \$1 million down the drain if their choice is not among the final, approved technologies.

MERC and Mario Tamburri strive above all things to remain independent. You won't hear him endorse a particular system, nor are you likely to hear him discount any commercial systems. On the other hand, he has seen enough and done enough testing along the way to say, "There just



isn't one magic solution. Many manufacturers are starting to go to a 'combination' solution. All have their limitations and there is no silver bullet. There isn't one treatment system that is going to work perfectly on every ship and on every trade. So that's why you have UV, deoxygenization, biocides, filters, chlorination, and all the rest."

Testing to determine how many or which organisms are alive, Tamburri cautions, is not perfect. In the world of invasive species, the micro-organisms are just as important to kill, so as to prevent introduction of "blooms" into other areas. Tamburri insists, "This isn't as obvious as the zebra mussels but it is equally as important. To test, sampling is very important – getting a volumetric average is the key."

Commercial Application: Important to MERC, Important to You

The MERC mantra of "encouraging buyers and sellers to engage with one another and make the necessary investments to accelerate the adoption of treatment technologies" will have no teeth unless all of that testing is done with an eye toward tying it into the realities of running commercial merchant ships on a tight budget. As a prime example, the MERC crew already understands that removing sediment out of ballast tanks – allowing ships to carry more cargo – also helps with invasive species. Says Tamburri, "It's a good first stage. A large majority of BWT systems include primary filtration, but we are also learning that plankton don't act like inert particles when it comes to filtering ballast

water. Plankton is naturally buoyant so sometimes they escape through a spinner or a filter – and treating high volumes is difficult."

What is quickly becoming apparent to MERC researchers is something that commercial shippers have always suspected: The size and type of vessel, trade routes, volume of ballast to treat, flow rate of that ballast, and a myriad of other factors will ultimately determine which system is best for a particular ship. One size does not fit all.

And testing – perhaps leading to approvals – will not end the debate. For example, the chlorination of ballast water certainly has a chance to succeed, but implicit with that system is the cost of chlorine. On the other hand, filtration or UV systems come with other costs: fuel and electricity expenses. As operators begin the process of choosing which system to employ, they'll have dozens of variables to plug into the equation, not the least of which will be the cost of installation. Mario Tamburri says flatly, "The fewer the moving parts and components, the better." And from a mariner's point of view, a single, simpler approach can make more sense – if it works.

End Game? Serious Work Continues at MERC Independent of Legislation, Balkanized Rules, Lawsuits, and a Paucity of Standards

Last January Dr. Rich Everett of the Coast Guard's Environmental Testing Division stated, "We are coming to the end of the process." Unfortunately, the Coast Guard's promise to publish a BWT standard in 2008 has, of course, come and gone. When a definable standard is finally introduced, industry is clearly ready to benchmark any number of solutions against that standard. To be fair, there are many layers to this onion. The primary delays involve the required environmental reviews. Here in the United States, that means the necessary EIA and NEPA reviews.

Everything else is probably background noise. A bill introduced by Representative Mark Kirk (R-IL), instructing the Director of the U.S. Fish and Wildlife Service to conduct a study of the feasibility of a variety of approaches to eradicating Asian carp from the Great Lakes and their tributaries and connecting waters (H.R. 51), is a perfect example. And then there is the EPA's report, entitled "Predicting Future Introductions of Nonindigenous Species to the Great Lakes," which followed a (failed) industry challenge to the so-called Michigan Ballast Water Statute. Michigan and California, in particular, have defined the word "Balkanization" as it applies to the labyrinth of U.S.-based, local invasive species statutes. The failure of industry to defeat Michigan will only embolden others to enact similar, but nevertheless different, measures. To its credit, the UN's IMO has weighed in, too. But its standard falls well short of what the U.S. will some day call for. It



NEI's Venturi Oxygen Stripping™ ballast water treatment system.



Severn Trent DeNora BalPure 1000 skid mounted unit.

is, in a word, a disaster.

Back at MERC, Mario Tamburri soldiers on. "I think there are reasonable solutions out there that are very close – and can make a big difference in solving the problem. Get them on ships. For us to wait for the perfect solution is foolish – it is a mistake. You can quote me on that." Tamburri's philosophy is borne from years of hands-on, "dirt-under-the-fingernails" sweat equity. Formerly employed at the Monterey Bay Aquatic Research Institute, he came across a project in Japan on deoxygenating ballast water with nitrogen gas. The effort involved bubbling nitrogen into ballast tanks to reduce corrosion. It reduced corrosion by 90 percent and – not surprisingly – it also killed most of the organisms in that ballast water.

Tamburri thus started out in this field almost ten years ago with a simple paper saying that deoxygenization could be one those "win/win" situations that saves industry money by reducing corrosion and also helps the environment by reducing invasive species. Funded several times by NOAA's Ballast Water Program, he has also been underwritten as a third-party evaluator of treatment performance.

Today, the Maritime Environmental Resource Center's main focus is to provide information and evaluate ballast water treatment systems. Mario Tamburri and Ross Kanzleiter are hoping to expand beyond that narrow window, looking at a variety of technologies for commercial shippers – things like oily water separators, gray water treatment and air emissions. Without a doubt, the scientific help that maritime interests have long sought is now at hand. Job One, however, is ballast water treatment systems. After that, the sky is clearly the limit.

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