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# Ship's experiments look for ways to prevent foreign stowaways

**MERC is one of four sites in the world testing systems that would reduce the influx of exotic species through ballast water**

**By Rona Kobell**

Most days, the *Cape Washington* sits in Baltimore's harbor, looking majestic as the sun hits its gunmetal-gray exterior. Inside, the 700-foot ship resembles a giant parking garage, although the ramps built to withstand the weight of Humvees and tanks are empty. A drill rumbles in the background, and the faint smell of fresh paint wafts from the walls. The *Cape Washington* feels like what it is: a ship, temporarily in port and undergoing repairs, waiting for its orders.

In short, it's not the sort of place where one would expect to find an active scientific experiment. And yet, just a few feet from the engine room, that's exactly what is taking place: a dozen scientists from several institutions poring over tubes, mixing in solutions and testing for various chemicals.

The goal: Figure out how invasive species are getting into the ballast water that ships take on to balance their mammoth loads and how to reduce their numbers by a factor of several thousand. Oh, and do it within the next two years, when the U.S. Coast Guard will adopt new and much stricter ballast water regulations.

For the last two years, the *Cape Washington* has been home to the Maritime Environmental Resource Center, one of just four institutions in the world testing the systems that companies are designing to reduce the number of bacteria, microbes, exotic plants, and animal larvae coming into waterways through ballast water. The other centers are in Duluth, MN; Norway; and The Netherlands. But MERC, as it is known, is the only one of the four centers that is physically located on a ship. Its location in the Chesapeake Bay allows it to test water from different salinities, with the ship occasionally testing water from Norfolk as well as Baltimore.

MERC's director, Mario Tamburri, is trying to prepare the shipping companies for new and stricter rules. Since 2004, the International Maritime Organization has maintained a standard of 10 organisms per cubic meter of water in each ballast tank. By 2012, the Coast Guard wants to start with the IMO standard and move by the year 2016 to one organism per cubic meter of water, a standard that is 10 times more strict. In comparison, Tamburri says, a ballast tank with no treatment system can bring in millions of organisms per cubic meter of water.

The reductions are "not easy to do," he said. "It's great to make the rules, but you need to make sure you have systems that work. The real bottleneck is getting these systems tested."

So, when the weather warms and organisms fill the water, the lab aboard the *Cape Washington* kicks into gear. Around noon, two days a week, water from the ship's ballast tanks begins flowing through a series of pipes laid out in a vast, warehouse-like space. Researchers wearing jumpsuits and protective goggles monitor the water as it comes in. To challenge the system, Darrick Sparks, a biological researcher, stirs in a muddy-like substance called Arizona Test Dust, which mimics the muddy conditions found in many ports. Other MERC researchers test for the quantity of organisms, bacteria, water acidity and temperature. Later, researchers will clean the remaining water with

chlorine and discharge it into the harbor.

MERC, which has a budget of about $800,000 and a staff of 20 full-time and part-time researchers, is funded in part by the Maryland Port Administration and the Maritime Administration of the U.S. Department of Transportation. Tamburri is based out of the Chesapeake Biological Laboratory, which is part of the University of Maryland Center for Environmental Science. Several of the researchers at MERC, including Sparks, are based at the Smithsonian Environmental Research Center, where MERC partner Gregory Ruiz has been studying ballast water issues for more than a decade. Researchers with the University of Maryland's Wye Research and Education Center conduct the chemistry work, while University of Maryland College Park researchers perform the bacteria tests.

Donald F. Boesch, president of UMCES, said the partnership between the port and the university marks a major step forward in tackling a huge environmental problem.

"If we can develop this widely trusted test bed for evaluating new technologies, it would be a great service to the nation and, indeed, to maritime shipping and coastal regions around the world," he said.

The partnership has no financial interest in any company's system, and Tamburri's team puts the test results on the Internet for all to see. Recently, it was testing the systems for Siemens, an international conglomerate. Tamburri says that some of the company's systems work better than others; it's a young technology, he said, and sometimes mechanical problems happen.

There have been logistical issues as well. Although the Maritime Administration has tried to keep the *Cape Washington* berthed in Baltimore for as long as possible, occasionally the ship's services have been needed to help with war efforts or humanitarian aid. When that happens, the crew gets 48 hours' notice to take the lab equipment off the ship - no easy feat considering the tubes, pipes and containers.

As a result, MERC will be getting its own floating barge, which will cost about $1.5 million to build.

That's a small price to pay if it keeps out invasive species. Zebra mussels, which arrived in the Great Lakes in the mid-1980s through ballast water, have spread to 23 states, costing billions of dollars in fouled pipes, infrastructure damage and causing dramatic changes in the Great Lakes' ecology.

In the Chesapeake Bay, ballast water probably introduced the Chinese mitten crab, a furry creature that competes with native crustaceans for food, and the rapa whelk, an aggressive sea snail that eats clams and oysters.

But as the ballast water problem is controlled through regulation and tested systems, Tamburri increasingly worries about the entire ship being a vector. He's looking at hull fouling, in which organisms latch onto the sides of the ship or little nooks within it and are not treated. Eventually, Tamburri believes, all of that will also be regulated. Scientists are also examining air emissions to try to control air pollution on ships.

Some environmentalists and regulators from states like Washington and California say the proposed Coast Guard ballast regulations don't go far enough. They would like to see the change happen right away, instead of being phased in, or a zero-tolerance policy instead of the allowable one organism per cubic meter. But, Tamburri said, those are not realistic. It is impossible to get everything out, and the technology is still being developed to get to the reductions the Coast Guard

proposed.

"We can refine the regulations, but right now, this is the best we've got," Tamburri said. "A lot of people say [the 10 organisms standard] is not strict enough, but we can't measure anything stricter - If you have a regulation that can't be met or enforced, then you're just delaying things."

**Rona Kobell is a former writer for the Baltimore Sun.**