# Establishing Ballast Water Test Facilities—Success!

## *A "win" for the environment and the marine transportation system.*

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The U.S. marine transportation system extends from the outer boundaries of the nation's exclusive economic zone to the inland ports of our rivers and Great Lakes, including approximately 25,000 miles of commercially navigable channels and hundreds of deep and shallow draft ports.[1]

As they carry goods and passengers, ships that transit our marine transportation system can also carry unwanted travelers—non-indigenous species, which can be transported on hulls or other surfaces and in water used for ballast. While ballast water is necessary for providing stability to a ship, it may be taken aboard in one ecosystem and discharged into another. The discharged water may contain species that are not native to the receiving water body, and, once introduced, they can displace native species, causing harm to the local ecosystem as well as disruption to the local economy.

With respect to America's marine transportation system, however, introduction of a non-native species in one region has the potential to impact several regions through the interconnected network of waterways. Unfortunately, the very nature of this efficient waterway system makes it vulnerable to the spread of non-native species.

The Maritime Administration (MARAD), an agency within the U.S. Department of Transportation, promotes the use of waterborne transportation and its seamless integration with other segments of the transportation system. MARAD is working on promising technologies to address the environmental challenges brought about by species invasion via ballast water.

**Looking for Solutions**

MARAD began working on viable ballast water treatment technologies in the early 2000s, as there were no shipboard-proven technologies available to meet any reasonable treatment standard. A major roadblock was the lack of a U.S. site dedicated to full-time testing of technology. Several systems had been placed on commercial ships for efficacy testing. However, the technologies were not quite ready for shipboard tests, and installations of unproven technology created disruptions in engine rooms and had the potential for delaying voyages without a guarantee of success.

MARAD's Ready Reserve Force vessels, 50 standby cargo ships normally in reserve awaiting use by the Department of Defense and docked at several ports around the U.S., provided a logical starting point for testing. They are pierside for several months during the year, providing technology manufacturers with stable platforms for testing and the opportunity to learn about ship systems and their associated challenges or limitations. The agency's in-house naval architects and marine engineers have been assisting with these efforts.

**All photos courtesy of the Smithsonian Environmental Research Center.**

**Establishing Test Facilities**

***Great Ships Initiative.*** In 2006, MARAD personnel worked with the Northeast-Midwest Institute to design a land-based facility capable of testing promising ballast water treatment technologies in accordance with International Maritime Organization (IMO) guidelines and in fresh water. The land-based facility in Wisconsin's Port of Superior operates as the Great Ships Initiative, or GSI. Scientists from the University of Wisconsin, Superior, and the University of Minnesota, Duluth, conduct the biological tests at the facility. In 2010, MARAD received funding from the Environmental Protection Agency's Great Lakes Restoration Initiative to further its efforts in the Great Lakes. Some of those funds were used to upgrade the facility to meet United States Coast Guard certification testing requirements.

GSI has tested numerous promising treatments at the bench-scale level as well as at the land-based facility, and continues to be a leader in finding systems that can perform in fresh water. GSI personnel have also conducted efficacy testing at sea. Tests of a promising treatment system are scheduled to be conducted aboard a Great Lakes vessel in the near future.

***Maritime Environmental Resource Center.*** In 2008, MARAD joined with the Maryland Department of Transportation and the University of Maryland's Center for Environmental Science to establish the Maritime Environmental Resource Center (MERC). Its initial focus was 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.

MERC was rolled out during a shipboard ceremony in Baltimore Harbor in July 2008. Test facilities aboard two of the Maritime Administration's Ready Reserve Force ships—the *Cape Washington* and the *Cape Wrath*—were completed, and IMO compliance tests of several promising technologies have been conducted aboard the *Cape Washington*.[2] MERC personnel have also conducted at-sea shipboard efficacy testing of treatment systems.

To add additional flexibility, the idea of a platform capable of being towed, which could facilitate testing technologies in several different salinities, was added to the MERC effort. MARAD provided funds toward the design and modification of an existing commercial barge to support the testing. While some testing would remain aboard the *Cape Washington,* the barge will be used as the primary platform for testing treatment technologies.

***Training Ship.*** The *Golden Bear,* a MARAD-owned training ship used by California Maritime Academy in Vallejo, Calif., was added to round out the agency's effort. MARAD signed a cooperative agreement with the academy and provided funding to modify the ship for testing treatment technologies and to conduct USCG certification tests. As a training ship, researchers benefit from a stable and static operational platform. The *Golden Bear* provides access to an operational ship with purpose-built laboratories for researchers working on treatment solutions so that actual underway testing can be achieved as the vessel sails on its training sea voyages. It also provides an opportunity to educate the next generation of merchant mariner cadets and industry partners on ballast water issues. Technology tests conducted by personnel from the Moss Landing Marine Laboratory were performed aboard the vessel during the 2010 and 2011 summer sea terms.

**The Future**

The facilities will continue testing of ballast water treatment technologies to help those developing technology gain IMO approval. MARAD's efforts are designed to help these facilities attain the capability to conduct tests as part of future USCG certification processes. Before the U.S. can have a successful domestic ballast water regulatory program, we must first have facilities capable of certifying ballast water systems. This can only be accomplished by a focused effort and an experienced team of people.

A successful ballast water test facility is a "win" for the environment and the marine transportation system. The effort is a testament to what can be accomplished with the sustained cooperation and innovation of our maritime industry, other federal agencies, and academia.

***About the author:***
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**Endnotes:**

1. http://www.cmts.gov/nationalstrategy.htm
2. The science team consists of personnel from University of Maryland's Center for Environmental Science and the Smithsonian Environmental Research Center.