

US EPA ARCHIVE DOCUMENT



**Fact Sheet**  
**Performance Verification of Ship Ballast Water**  
**Treatment Technologies and Exchange Screening Technologies**  
**January, 2007**

The EPA's Environmental Technology Verification Program (ETV) and the U.S. Coast Guard's National Ballast Water Management Program are participating in a joint effort to develop a performance verification protocol for new ballast water treatment technology for installation on board ships. ETV is also cooperating with Coast Guard in developing a protocol and will test technologies that screen whether ballast water exchange has taken place. Ballast water exchange is the current approach used by ships to reduce the introduction of marine organisms and is viewed by experts as an interim solution. Also, ships cannot perform ballast water exchange during rough sea conditions.

**Background:** The overwhelming majority of the world's trade goods are transported by modern shipping. An unintended consequence of this vital mode of commerce is the uptake and transport of marine organisms in ships' ballast water, and the deposition of these organisms during ballast water discharge into non-native, and ecologically sensitive coastal areas. Although many organisms don't survive the journey or the introduction into new environments, some species flourish in their new environments without natural predators. The more environmentally tolerant species become invasive and can alter the ecological balance. Invasive species can cause habitat damage, and may cause public health concerns and significant damage to water treatment infrastructure as evidenced by the Zebra and Quagga mussel infestations of the Great Lakes.

Recent advances in establishing both national and international ballast water exchange and discharge standards for ship ballast water to reduce the global proliferation of aquatic invasive species has encouraged private industry to develop treatment technologies and exchange screening technologies to address the proposed standards. Recognizing the need for these technologies to be independently evaluated and verified, and to accelerate commercialization and marketplace acceptance, the EPA and the U.S. Coast Guard are jointly developing a protocol for the performance verification of shipboard ballast water treatment technologies. EPA and Coast Guard are also jointly developing a protocol for testing ballast water exchange screening technologies and will soon test these technologies.

**Project Descriptions**

**Ballast water treatment technology:** The treatment technology protocol is designed for use at a land-based testing facility, and will accommodate full-scale marine systems for either in-tank, flow-through, or combination treatment approaches. Water quality conditions for the tests will be adjusted to represent extreme, but not rare, natural conditions. In addition to ambient organism populations, surrogate organisms will be selected to represent bacteria, zooplankton, protists, and



phytoplankton species. The protocol is being pilot-tested at the Naval Research Laboratory's (NRL) Ballast Water Treatment Technology Testing Facility at Key West, Florida, which was developed under a Coast Guard Agreement with NRL using the draft protocol's testing specifications. The goal of this project is to develop and demonstrate a comprehensive, yet cost-effective technology verification protocol that can be used to evaluate new and innovative ballast water treatment technology in a fair and reproducible manner, independent of geographic location. When completed in 2007, the verification protocol will enable the evaluation of new technology, independent of the manufacturer, at any compatible testing facility worldwide. Purchasers of new ballast water treatment technology will be able to select appropriate systems based on credible data. Use of these systems on board commercial ocean vessels will ultimately contribute to reducing the proliferation of aquatic invasive species worldwide. The International Maritime Organization (IMO) is also developing a protocol for testing ballast water treatment technology; the ETV protocol is serving as the basis for the IMO protocol.

**Ballast water exchange screening technology:** The protocol for technologies that screen for ballast water exchange is currently under development. US Coast Guard's Research and Development Center at Groton, Connecticut is being supported by USEPA's ETV program in the protocol development and testing effort. Testing and reporting will be complete by the end of 2007. One parameter which distinguishes open ocean water from coastal water is colored dissolved organic matter (CDOM). CDOM refers to the fraction of dissolved organic matter that absorbs light and fluoresces in the ultra-violet and visible regions of the spectrum. Portable CDOM technologies will be evaluated against a standard CDOM measurement approach which uses scale excitation-emission spectrometry under controlled laboratory conditions. Field technologies will be tested for accuracy, linearity, precision, method detection limit, inter-unit reproducibility, temperature effects, matrix effects, data completeness, and operational factors such as ease of use and maintenance. Desirable attributes of the technologies are that they be robust, rapid, accurate and portable.

**Technical Contacts:** Treatment technologies - Ray Frederick at 732-321-6627 or [Frederick.ray@epa.gov](mailto:Frederick.ray@epa.gov) and Tom Stevens at 734-769-5347 or [stevenst@nsf.org](mailto:stevenst@nsf.org) ; Exchange screening technologies – Robert Fuerst at 919-541-2220 or [fuerst.robert@epa.gov](mailto:fuerst.robert@epa.gov) or Amy Dindal at 561-422-0113 or [dindala@battelle.org](mailto:dindala@battelle.org).