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Ballast water can transport harmful organisms.

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# Tests used to ensure ships don't carry deadly cargo draw sharp criticism

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By [Erik Stokstad](#)

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In the early 1990s, an epidemic of cholera killed thousands of people in Latin America. The new strain came from Asia, and experts suspected cargo ships of accidentally transporting the pathogen in the water that fills their ballast tanks. In order to prevent such outbreaks, and the spread of invasive species, many nations have agreed to require ships to [treat their ballast water](#) starting next year. Installing the treatment systems may cost the shipping industry \$70 billion.

Now, two scientists are [criticizing the tests used to validate the cleaning technologies, saying they don't ensure that they can kill disease-causing bacteria](#). "We have this system of testing and certification that in virtually

all cases is meaningless," says Andrew Cohen, a marine biologist and [consultant on invasive species](#) in Richmond, California.

The critique is rejected by Allegra Cangelosi, president of the Northeast-Midwest Institute in Washington D.C., a nonprofit group that helps [test ballast water treatment systems](#) as part of the [Great Ships Initiative](#). She notes the tests do check levels of harmless bacteria, which can suggest how effective the technology might be at killing harmful varieties. Meanwhile, the International Maritime Organization (IMO) is reviewing its guidelines for the tests.

Cohen became interested in the microbial tests in 2010 while on a science advisory panel that was reviewing ballast water technology for the U.S. Environmental Protection Agency (EPA). The treatment systems use a variety of approaches to kill stowaways, including filtration and zapping the water with ultraviolet light. Labs evaluate the systems according to [guidelines set by IMO](#) in 2008. To be certified for installation in ships, the systems must remove enough phytoplankton, zooplankton, and three kinds of microbes that indicate human health hazards, including the presence of sewage and cholera. So far, testers have certified about 50 kinds of treatment systems.

After the EPA panel concluded its work, Cohen teamed up with fellow panelist Fred Dobbs, a marine microbiologist at Old Dominion University in Norfolk, Virginia, to take a closer look at the underlying data. The pair tracked down the results of 390 tests conducted between 2003 and 2013. “Looking at the data, I was shocked,” Cohen says. The tests, he says, were too easy. In almost two-thirds of tests, the water that went into the treatment systems already had no detectable target bacteria, such as coliform, *Enterococcus*, or cholera. So, he says, it was little surprise that many tests found none of the bacteria after treatment was finished. And in some cases, the treatment tanks actually acted like incubators, increasing the number of bacteria rather than killing them. The [findings](#) were published online today in *Marine Pollution Bulletin*.

Cangelosi says [testing guidelines in the United States](#) are stricter than those of IMO. “With IMO guidelines currently, there may have been testing conditions that were too easy. But I don’t see that problem with U.S. testing.” More broadly, she says that testing for declines of nonpathogenic bacteria can show whether treatment systems work. But Cangelosi concedes that “there is ongoing debate about whether that’s the right way,” pointing to the need to validate the significance of measuring surrogate organisms.

Cohen says it’s not advisable to assume that treatment systems that can kill nonharmful microbes also slay more dangerous pathogens. He and Dobbs would like to see IMO require tests to start with water samples that contain levels of harmful microbes comparable to those found in real-world waters with contaminated sewage flows.

This past October, the International Chamber of Shipping, a trade association for ship operators, was one of several organizations to [call for IMO to tighten its testing guidelines](#) for ballast water treatment equipment. “It is essential that the treatment efficacy is sufficiently challenged to provide a real life operating scenario,” they wrote.

IMO declined to comment on the new findings, but noted that its Marine Environment Protection Committee is reviewing the testing guidelines. Experts meet next week and will accept comments until 20 March. A final report will be discussed by the panel in May.

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