Report: Tests of ballast water treatment systems are flawed

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Government-sanctioned tests of equipment designed to cleanse ship ballast water of invasive species are seriously flawed because they don't determine whether the systems will remove microbes that cause gastrointestinal illnesses, scientists said Wednesday.

Ballast water provides stability for cargo ships in rough seas. But it's believed to have introduced numerous invaders to U.S. coastal waters and the Great Lakes, including zebra mussels, spotted jellyfish and Japanese shore crabs, along with bacteria and viruses.

The Environmental Protection Agency and the Coast Guard have set limits on the number of live organisms ballast water can contain, based on standards proposed by an international agency in 2004. To comply, ship companies must install technology that kills enough creatures to meet the limits.

Laboratory testing of treatment systems has been conducted for 10 years. But a newly published paper in the *Marine Pollution Bulletin* contends the evaluations have a crucial defect: They don't adequately measure the systems' effectiveness against three disease-carrying microbes that the regulations target. One of them, E. coli, can indicate the presence of fecal sewage.

"This is a real problem," said Andrew Cohen of the Center for Research on Aquatic Bioinvasions in Richmond, California, who wrote the paper with Fred Dobbs of Old Dominion University in Virginia. "We know

there are serious pathogens in ballast water. There's good evidence that ballast water has moved them around the world and into U.S. waters."

The Coast Guard declined to comment and EPA had no immediate reaction to the report.

Some experts believe ballast water from Asia caused a 1991 cholera outbreak in South America that killed 10,000 people, Cohen said. According to the paper, at least 38 species of disease-causing bacteria have been detected in ballast tanks.

Companies are developing on-board cleansing systems using tools such as filters, chemicals, ozone and ultraviolet light. University and private laboratories are testing how well they work. Fifty-three systems have won approval from at least one country with membership in the International Maritime Organization.

The U.S. Coast Guard and EPA have yet to certify any system but have allowed the temporary use of 45 endorsed by other nations.

Cohen and Dobbs said they obtained data from 390 tests conducted on 38 treatment systems between 2004 and 2013. They said in 95 percent of the tests, the water samples contained so few of the targeted microbes from the start that they met the standards even before the treatments began.

"The equipment being tested would have passed the microbe tests even if it hadn't been turned on," Cohen said.

The process should be improved and all tests conducted thus far redone using water containing microbial levels "comparable to what ships would encounter in a bad situation out in the real world," he said.

Allegra Cangelosi, principal investigator with one of the organizations conducting the testing, said the absence of high pathogen levels in water samples is well known and doesn't invalidate the tests' effectiveness. She said there's no proof that treatment methods shown to kill aquatic plants, animals and other forms of bacteria are less lethal for disease-carrying bacteria.

"I don't think this is as drastic a situation as (Cohen's) rhetoric would cause you to believe," said Cangelosi, of the Great Ships Initiative, which evaluates ballast treatment systems in the Great Lakes region.