



Ballast Water Treatment Rollout Should be Revised



BY

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Guest Editorial

After over 20 years of research and negotiations, the International Maritime Organization (IMO) and the U.S. Coast Guard (USCG) are starting to implement and enforce ballast water (BW) regulations. Based on the phase-in schedule, between now and 2024 about 60,000 ships will need to spend an average of \$1 million to \$2 million each to purchase and install ballast water management systems (BWMS). This is resulting in eye popping predictions about enormous growth in global BWMS markets to well over \$100 billion. One global market intelligence report projects these markets “will grow at a compound annual rate of 39.4% starting in 2018 and reach \$395.65 billion by 2026.”

Unfortunately, using insights from recent economic research results in different predictions. Based on this view, global BWMS markets will not grow significantly for as many years as it takes for the current strategies that IMO and USCG are using to implement BW regulations to fail and be replaced by ones that nurture BWMS markets.

IMO and USCG BW regulations impose two basic compliance requirements on ship owners. Ships need to purchase and install a type of BWMS that has been tested and officially certified by either IMO or USCG or both as being capable of killing or removing enough potentially harmful organisms in BW for the ship's BW discharge to meet allowable standards. And, when the BW discharged by those ships is monitored and tested for compliance by port state authorities it must actually meet those allowable BW discharge standards.

As of February 2018, over 70 separate BWMS have been "type approved" by IMO and six by the USCG. However, evidence is mounting that a significant percentage of these type approved BWMS that have been installed on ships are not functioning properly in a mechanical sense. Additional evidence is mounting that a significant percentage of those that are functioning properly are not likely to be able to meet allowable BW discharge standards.

What this means in terms of BW regulations and BWMS markets depends on why certified BWMS are not performing as expected when they are installed on ships. There are three basic possibilities: (1) the units installed on ships had manufacturing defects; (2) they were not scaled correctly to the ballast water discharge rate of the ship on which they were installed, or were not installed or operated or maintained properly; or (3) the certified BWMSs were installed and scaled properly, but passed IMO and/or USCG certification testing when they should have failed.

Evidence of BWMS failures that result from (1) or (2) can be eliminated over time, during what IMO refers to as an "experience building stage," as ship owners work with BWMS manufacturers and installers and improve crew training to get their BWMS units operating and performing properly. Evidence that BWMS failure is a result of (3), certification testing problems, creates bigger challenges for BWMS markets and the implementation of BW regulations that cannot be worked out by industry. They can only be addressed by IMO and/or USCG regulators, and when that happens will determine when BWMS markets develop and when BW regulations will be enforceable.

To put the situation in context, it is useful to view both IMO and USCG BW regulations as enormously ambitious and complex attempts at what economists call “technology forcing regulations (TFRs)” and consider each of the five stages of the strategies IMO and USCG are using to implement them:

- (1) Set a biological BW discharge standard that cannot be achieved with technologies that are available at the time;*
- (2) Establish a time in the future when these biological standards will be enforced;*
- (3) Trust that potential profits in markets for BWMS technologies that can meet these standards will attract enough investments in research and development for them to be developed in advance of the time the regulations are scheduled to be enforced;*
- (4) Trust that those same market profits will result in enough investments in BWMS manufacturing and installation capacity to allow widespread shipping industry compliance by the time the regulations are enforced;*
- (5) Start enforcing the regulations.*

The fact that IMO and USCG have both certified BWMS implies that Stage 3 is complete. However, consider the insights of economic research that earned George Akerlof, Michael Spence, and Joseph Stiglitz the 2001 Nobel Prize in economics. Their work demonstrated conclusively how “quality uncertainty” destroys markets, prevents them from developing, or results in bad quality forcing good quality out.

In the case of regulation-driven markets, like markets for BWMS, this is particularly important, because buyers and sellers in regulation-driven markets are only as quality conscious as regulators require them to be. This implies that ship owners, if they are forced to purchase and install a certified BWMS, will purchase the least-cost units they believe will put them in compliance.

There is mounting evidence that “quality uncertainty” has been introduced into BWMS markets by inadequate IMO and USCG testing and certification standards, and is preventing buyers and sellers from entering BWMS markets. For a variety of reasons, statistics about the numbers of certified BWMS that have been purchased and installed on ships are very difficult to obtain. However, publicly available data from the USCG-funded National Ballast Information Clearinghouse (NBIC) shows that of the 6,818 ships that discharged BW into US waters during 2017 only 14 ships (0.2%) used a USCG-certified BWMS. Of the remaining 6,804 ships only 10.9% used an alternative

management system (AMS). These numbers indicate that BWMS markets, especially the market for USCG-certified BWMS, remain relatively small.

The second area of relevant economic research won Joseph Harsanyi, John Nash, and Reinhard Selten a Nobel Prize in 1994 and can be used to predict how the shipping industry can be expected to respond to certification-based “quality uncertainty” in BWMS markets. That work involved the development “game theory” which was used to characterize, among other things, how regulated industries can be expected to employ legal, political, and public relations strategies to avoid, delay, and reduce regulatory compliance costs. Based on this logic, the hundreds of billions of spending on certified BWMS that provides the basis for highly optimistic BWMS market projections represents the compliance cost savings to the shipping industry if BWMS markets do not develop.

With these compliance cost savings at stake it is reasonable to assume that once IMO and USCG start enforcing BW regulations in ways that could impose significant costs on the shipping industry, the failure of some certified BWMS to meet allowable BW discharge standards will be used to challenge the enforcement of IMO and USCG BW regulations. There is no space here to list and document the mounting evidence that certified BWMS are not performing adequately, and that enough of the blame rests with inadequate BWMS certification testing for shipping industry challenges to the implementation of BW regulations to succeed.

A 2016 survey by the American Bureau of Shipping (ABS) indicated that certified BWMS installed on 220 ships, when tested, were inoperable or had significant operating problems 43% of the time. However, that failure rate was defined in mechanical terms (e.g., did it turn on, did the UV bulbs light up, how quickly did the filters clog) and not in terms of whether the BWMS was capable of achieving allowable BW discharge standards. Data regarding the ability of certified BWMS that are operating properly to meet specific discharge standards are not generally available. However, some unofficial reports from limited BW discharge testing indicate that about half of certified BWMS that are operating properly may fail to routinely achieve allowable BW discharge standards.

There is other indirect evidence that certified BWMS may not be able to achieve allowable BW discharge standards. For example, Maritime Executive reported in February 2018 that one authorized BWMS testing facility in [Singapore](#) decided to stop shore-based BWMS testing because it determined that its “challenge water” was inadequate and its test results should not have been used to justify BWMS certification.

In January 2018, the BWMS test facilities at the University of Maryland Center for Environmental Science (MERC) decided to stop testing BWMS completely in order “to protect the scientific integrity and reputation” of the institution. The announcement of the closure cited “shortcomings in both the IMO (G8) guidelines and the USCG certification testing process” and “significant uncertainty about the quality and value of test results . . . and their use to support regulations.”

Further evidence that certified BWMS may not be able to achieve allowable BW discharge standards because of inadequate certification testing standards appeared in [another article](#) in early February 2018. Surprisingly, that article was written by the directors of one of the approved USCG testing facilities (Golden Bear Research Center in California (USA)) that is still operating, and was aimed at condemning the growth of what they called “ballast water pessimism” and “the swelling doomsday sentiment” about the limitations of current treatment systems and testing regimens.

In that article, the authors asserted that if 60,000 ships installed and used BWMS that passed their tests, the decline in marine invasive species threats “would be call for celebration, not criticism.” Whether or not this may be true, the owners of 60,000 ships will not invest billions in equipment that does not meet regulatory requirements.

In any case, there is mounting evidence that some certified BWMS that were scaled and installed properly on ships cannot routinely meet allowable BW discharge standards.

Fundamental economic research shows: (a) how this is likely to inhibit the development of BWMS markets; and (b) how it will be used by the shipping industry to avoid or delay compliance costs by preventing BWMS markets from developing.

Based on the economic fundamentals of TFRs described earlier, it now seems clear that IMO and USCG moved too quickly to certify BWMS in Stage 3 which created “market uncertainty” in Stage 4. This is inhibiting the development of BWMS supply (Stage 4), and also means that ongoing attempts by USCG and IMO to stimulate BWMS supply by moving ahead to Stage 5 and attempting to stimulate BWMS demand by promising to enforce BW regulations is unlikely to succeed.

A better strategy would be for both IMO and USCG to return to Stage 3 and reduce “quality uncertainty” in BWMS markets by retesting and recertifying available BWMS using more reliable, more uniform, and more transparent testing protocols and certification standards. That will stimulate BWMS supply (Stage 4) and allow BW regulations to be enforced (Stage 5).

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