Using ship’s device-produced drinking water to achieve a ballast free management

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The ballast system is essential for the safe operation of a ship. However, the discharge of about five billion tons of seawater ballast water around the world annually, which is loaded with organisms from other parts of the ocean, has already caused serious environmental impacts worldwide, such as the invasion of alien marine species, bacteria, or viruses. The discharge of ballast water is adversely affecting marine ecosystems of the global oceans and human’s health. The International Maritime Organization developed and adopted the “International Convention for the Control and Management of Ships' Ballast Water and Sediments (also known as the Ballast Water Management Convention or BWM Convention)” in 2004. Now all ships are required to have a ballast water record book and to carry out ballast water management procedures to a given standard. This study proposes a ballast free approach that, when the dedicated ballast tanks of a ship are changed to drinking water tanks, the storage of drinking water produced by on-site desalination (such as through distillation, reverse osmosis, or a combination of both) can be used to compensate the stability change by weight loss due to fuel consumption. Using a 60 m length and 2,057 tonnes ocean-going salvage tugboat, the “Salvage Titan”, as an example, we show that a simple merchantable distilled water maker, which consumes less than 26.6 kg of diesel oil daily, is sufficient to meet the need. Using our proposed method, two ships, Salvage Champion (65m length, 1,830 tonnes) and Salvage Ace (65m length, 1,714 toones), were certificated by the American Bureau of Shipping, stating that two ships contained no ballast water tank and shall not subject to the BMW Convention. Since that on-site produced drinking water is environmental harmless and our proposed method is easy and economical to install, ships with similar existing seawater ballast systems can be modified with our proposed method to meet the needs of BWM Convention and to avoid the environmental impacts caused by the use of traditional seawater ballast system.

Keywords: ballast, drinking water, distilled water, International Maritime Organization, BWM Convention, ballast free

