Ballast Water Management and Environmental Protection

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Edited by

Fikile Portia Ndlovu

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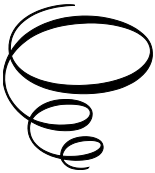

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PREFACE

Ballast water management has been a subject of great interest in the last decade and more so in 2017/2018 as the IMO[1*] rules have come into force. Ships, depending on their survey certificate are all at some point expected to be compliant with the D-2[2*] IMO standard for ballast water management. This book through a series of research papers will look into the practicalities of ballast water management going into the future. Some topics around the industry on this matter will be explored from the perspective of certain nations around the world and shipping companies registered in various flags around the world. Insight into the compliant, ballast water safe ship of the future will be considered in light of innovation, financial impact, environmental technologies, ship repair and ship building. The expertise used to create this book are conducted under the research efforts of the special purpose maritime related education system of the Massachusetts Maritime Academy (MMA) and contributions from Professors and industry professionals from various jurisdictions.

This book serves as a demonstration of commitment to research and innovation. The book is also a tool intended to synthesize the very important knowledge of ballast water management especially in light of recent regulatory developments and its importance to the future of the marine environment. No book can contain all the knowledge on ballast water, however, this book can be treated as a timely contribution to this topic especially in light of EPA[3*] and USCG[4*] efforts to protect the marine environment of the USA with global cooperation and the enforceability of the IMO's Ballast Water Management Convention of 2004 (BWM Convention), having finally entered into force on 8 September 2017.

[1*] The International Maritime Organization (IMO). See, Appendices at the back of this book.

[2*] IMO, Ballast Water Management Standard. This standard is practically achievable through the installation of various technologies to achieve compliance in ensuring that no invasive species are introduced through ballast water in shipping activities going forward. See also, glossary of terms.

[3*] Environmental Protection Agency.

[4*] Unites States Coast Guard.

This book also serves as a quick reference material with appendices of the relevant rules. The seas are ultimately interconnected with the ship as the vector for the transportation of foreign waters, therefore two questions must be answered as a global moral obligation: 1. How do we stop new invasions from ballast water? 2. What attempts can be made to dealing with current invasions? Authors in this book tackle these and other relevant questions and ballast water management concepts together as a pragmatic example working together in academia, science and regulation so that even more ballast water management solutions can be inspired and found. There are certain technical aspects of the technology that have a recurrent theme in the book however the authors take on varying interpretations and aspects of those themes and together they indirectly highlight ballast water champions and contributors to the ballast water management solutions. Lastly, this book seeks to celebrate innovation and specifically innovators such as CEO of Freedom Ballast, Bill Burroughs whose passion for closing the door to new invasions through ballast water was palpable as he represented his company at this year's (2022) post-Covid lockdown CMA (Connecticut Maritime Association) event in Stamford Connecticut, USA.

ACKNOWLEDGMENTS

Thanks and acknowledgment goes to the co-authors and contributors to this book. Thank you for your many years of caring about the marine environment and choosing to join the moral fight for the health of our oceans through your written records.

More thanks goes to the Massachusetts Maritime Academy for inspiring this book by providing funding to attend conferences and innovation forums which has greatly inspired this work.

Finally we thank the members of the shipping industry who not only cheer our work on but also took it personally by participating in the survey on ballast water management and providing insight on industry attitudes concerning this very important topic.

As special thanks to Scorpio's Cameron Mackey (CFO) for the time he took a moment in his busy day to speak to the editor on a long call about what Scorpio was doing about Ballast Water Technology and compliance.

A special thanks to the WMU for keeping a friendship and association with all those involved with the protection of the maritime/marine industry and providing experts to contribute to this tome.

On a personal note, I am so grateful for my family, friends and colleagues for all the support, especially Mrs. Nekea Frisbee and Mrs. Hannah McCabe for the many hours of caring for my toddler while I completed our project.

EDITOR'S NOTE

This book is a marine and maritime community brainchild supported by passion for research, scholarliness, inter-disciplinary collaboration, problem solving and legal compliance. After many years of attending conferences on ballast water management and hearing about the high levels of innovation to solve some of the problems that plague the marine environment, an effort was made by the contributing authors of this book to inspire more thoughts around this very serious subject. We are also facing the reality of Arctic waters being more viable for more shipping routes and thus a challenge to research the impact of ballast water in such temperatures will need to be explored so as to avoid unintended consequences of introducing invasive species or unleashing some other unforeseen marine biosafety apocalypse. The authors discuss the law, the science, the responsibilities, the financials, the risk management and cyber profiling of some of the issues around aquatic invasive species and ballast water management. Most importantly this book revives the all-important discussion of what to do about current invasions even if the world succeeds in stopping new invasions. With the power of computation, Blockchain technology, the Internet of Things (IoT) and powerful scientific discoveries and practicalities of technologies such as CRISPR, what can we not do as humanity to solve the invasive species problem?

It is submitted that understanding the ballast water management issue through books such as this contribution, we can collaboratively come up with solutions to keep our oceans safer and healthier without international trade and the traversing of ships being negatively affected because we need it. The editor and authors of this book may (if naturally possible) be reached for further consultative and educational activities. All this being said, how can we innovate on problems we don't even have a concept of? The editor submits that this very useful video by the International Maritime organization's committee is a good start for anyone who wishes to understand the call for more innovation captured in this book and it can be found here: IMOHQ. (2013). Invaders from the Sea, a BBC Worldwide IMO Production. https://youtu.be/u5JkRtMTEdI (Accessed 01 May 2019).

GLOSSARY OF TERMS

ABS - ABS. American Bureau of Shipping Incorporated by Act of Legislature of the State of New York 1862

AIS – Aquatic Invasive Species

Ambient Water – Water that relates to bodies of water such as lakes, rivers and oceans

AMS – Alternate Management System (ballast) is a BWMS that is approved by a foreign administration in pursuit of compliance with the BWM Convention, 2004 that has been determined to be an AMS by the USCG after a request in writing has been made to the USCG for such a determination

BALLAST WATER – Ballast water is water carried in the ship's ballast tanks in order to maintain stability, balance and trim. It is water that is taken up or discharged depending on whether cargo is being loaded or discharged or when a ship needs extra stability in poor weather.

BOB – Ballast on Board

BWMS – Ballast Water Management System

CFR – Code of Federal Regulation, United States of America

Chemical Controls - are any methods of attack that involve herbicides, disinfectants, or other chemicals to kill invaders.

COTP - Captain of the Port (COTP) means the Coast Guard officer designated as COTP of either the Buffalo, NY, Marine Inspection Zone and Captain of the Port Zone or the New York, NY, Captain of the Port Zone described in part 3 of this chapter or an official designated by the COTP

D-2 – IMO STANDARD: 'Regulation D-2 Ballast Water Performance Standard - Ships conducting ballast water management shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometres in minimum dimension and less than 10 viable organisms per milliliter less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometres in minimum dimension; and discharge of the indicator microbes shall not exceed the specified concentrations. The

indicator microbes, as a human health standard, include, but are not be limited to:

> a. Toxicogenic Vibrio cholerae (O1 and O139) with less than 1 colony forming unit (cfu) per 100 milliliters or less than 1 cfu per 1 gram (wet weight) zooplankton samples;
>
> b. Escherichia coli less than 250 cfu per 100 milliliters;
>
> c. Intestinal Enterococci less than 100 cfu per 100 milliliters.' This means that port State control will have to test the ballast water to be discharged to see if it meets the standards established here. This means scheduled vessels must have a Ballast Water Management System (BWMS) on board that will ensure that this standard is met.

Ecotoxicology – The study of the adverse effects of chemicals on the environment and living organisms (ecology and toxicology).

EEZ – Exclusive Economic Zone of a coastal State, for example, 'The U.S. Exclusive Economic Zone (EEZ) extends no more than 200 nautical miles from the territorial sea baseline and is adjacent to the 12 nautical mile territorial sea of the U.S., including the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands, and any other territory or possession over which the United States exercises sovereignty.'

EPA – The Environment Protection Authority, Australia

GloBallast – A project implemented by the United Nations Development Project (UNDP), executed by the IMO under the direction of the Global Environmental Facility (GEF) waters portfolio. *'Building Partnerships to Assist Developing Countries to Reduce the Transfer of Harmful Aquatic Organisms in Ships' Ballast Water*, simply referred to as GloBallast Partnerships (GBP)'

HAOP - Harmful Aquatic Organisms and Pathogens

IACS – International Association of Classification Societies

IMO – The International Maritime Organization

IOPPC - International Oil Pollution Prevention Certificate

ISO - International Organization for Standardization

IoT – Internet of Things

Mechanical Controls - any that physically remove or curtail the invasive species, either through trapping, barriers, or harvesting.

NOAA – The United States National Oceanic and Atmospheric Administration

NOBOB vessels – No Ballast on Board

NPDES – National Pollutant Discharge Elimination System

PWS – Public Water System (US)

TBELs – Technology Based Effluent Limitations

UNCLOS - The United Nations Convention on the Law of the Sea

USCG – The United States Coast Guard

USEPA (US EPA) – The United States Environmental Protection Agency

VGP – Vessel General Permit

WOTUS – Waters of the United States

WQBELs – Water Quality Based Effluent Limitations

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