

AN INTRODUCTION TO BUNKER OPERATIONS

Nigel Draffin



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Dedication

This book is dedicated to my two sons, David and William, in the hope that they will forgive me for all of the times I missed appointments, sports days and important events in their lives whilst they were growing up.

Nigel Draffin



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by

Nigel Draffin

M.I.Mar.E.S.T.

First Edition

Foreword by

Capt. Cees de Keijzer

President, World Ship Society Rotterdam Branch

Former Senior Policy Adviser and Bunker Coordinator, Port of Rotterdam

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Foreword

Nigel Draffin has had a complete lifetime in shipping and half of that has been spent in the bunker industry. While he has of course dedicated many years to the International Bunker Industry Association (IBIA), his personal quest to elevate the level of education and understanding within the bunker industry stands out most.

These ingredients, blended with his incredible capability of transferring knowledge to other people, guarantee that he delivers quality in the precise quantity. Even when he is explaining a rather complicated matter, he is able to keep it simple. That is his strength.

As long as I have known Nigel – and it has now been for some twenty years – he has always been ready, willing and able to clarify the business of bunkering to anybody with the slightest interest in the subject. And he has always done so with a unique energy and passion. I still remember his first blueprint for the IBIA *Basic Bunkering Course*, which is now continually presented around the world.

Nigel's first book, *An Introduction to Bunkering*, was published in May 2008, followed by his second title, *An Introduction to Fuel Analysis*, which was published in June 2009. Written in a clear and easily-read format, both books are designed to help newcomers and non-specialists in the bunker industry, and both are still very much in demand.

Now, for the third year in a row, a new Nigel Draffin book has appeared. *An Introduction to Bunker Operations* is obviously written by someone with immense experience in the practical side of bunkering. It is so refreshing to read a book that is dedicated to bunkering operations as they really are.

From coal and steam in the old days, to the MARPOL issues of today, this book covers all aspects of bunkering operations and includes a wide range of detailed and enlightening photographs, charts and illustrations to heighten the reader's appreciation of what this industry is all about.

Beyond question, marine fuel is regarded as the lifeblood of shipping and, with the high prices and all the changes that are still to come, we should be always aware of how many thousands and even millions of dollars are involved every time a ship receives bunkers.

I am convinced that this book will be of great help to anyone involved in storing, blending, delivering, sampling or handling marine fuels in whatever way, now and in the future. It is about time that a well researched and produced book like this has seen the light of day and I recommend it heartily.

Capt. Cees de Keijzer
President, World Ship Society Rotterdam Branch
Former Senior Policy Adviser and Bunker Coordinator, Port of Rotterdam

May 2010

Preface

After completing my last book, *An Introduction to Fuel Analysis*, my publisher asked me what I wanted to write next. When I told him I wanted to write about the history of the business, he said that I could not do that until I had tackled the subjects of bunkering operations and commercial issues. I had to agree that these have more relevance to those seeking to work in the bunker industry today.

This book is intended as a guide to the operational aspects of bunkering for people who are not specialists in delivering marine fuels but need to understand the 'how' and 'why' of getting fuel onto ships.

I hope the barge operators, terminal operators and road tanker fleet professionals will forgive me for trying to simplify the complex and difficult job they do, but I know from the questions I have been asked over the years that for most of us, the operations involved seem to throw up problems and restrictions that we do not understand. This book is intended to explain and put the whole process into context.

An Introduction to Bunker Operations is not a guide to running a delivery fleet. Nor is it a source of 'model' procedures for ships' staff. It is intended to demonstrate what happens in the real world and identify good practice, while explaining some of the areas which cause the most difficulty for the buyers and sellers of marine fuel.

I have been helped by many people from different sectors, and have received a lot of encouragement from those who believe that there is merit in having one book covering all of the different operational areas.

I have tried to avoid going into too much detail in order to keep information accessible to all.

Nigel Draffin

May 2010

About the author

Nigel Draffin has been involved in shipping for over 44 years and with the commercial bunker market for over 24 years. After joining Shell Tankers as an apprentice engineer in 1966, he progressed through the ranks, serving on all classes of vessel including very large crude carriers (VLCCs) and liquefied natural gas (LNG) tankers.

He came ashore in 1979 to join the newbuilding department of Shell International Marine. After two years of new construction in Ireland, South Korea and the Netherlands, he transferred to Shell's Research & Development unit, specialising in control systems, fuel combustion and safety systems.

In 1986, Nigel moved to the commercial department as a bunker buyer and economics analyst. In 1988, he was promoted to be Head of Operational Economics, responsible for all of the fuel purchased for the Shell fleet, the operation of the risk management policy and the speed / performance of the owned fleet. In March 1996, he joined the staff of E.A.Gibson Shipbrokers Ltd in the bunker department, and became the manager. In 2006, this department merged with US-based broking house LQM Petroleum Services, where Nigel is currently Senior Broker and Technical Manager.

Nigel is a founder member of the International Bunker Industry Association (IBIA) and has served twice on its council of management, most recently as Honorary Treasurer. He currently serves as co-ordinator of the Education Working Group and is the author of IBIA's *Basic Bunker Course*. He is a member of the Institute of Marine Engineering Science and Technology and Past Master of the Worshipful Company of Fuellers.

Nigel has become a prolific writer on the bunker industry. His first book, *An Introduction to Bunkering* (2008), published in English and Spanish, has helped open up the industry to newcomers worldwide, and has quickly become an international best seller. His second book, *An Introduction to Fuel Analysis* (2009), has contributed hugely to the understanding of fuel testing and analysis and provides an essential reference to those who, whilst not specialists in the technical aspects of marine fuels, need to understand the terminology and the reporting used in fuel analysis as part of their work. This, the third title in the series, delves deep into the complexities of bunkering operations but still employs the simple language and detailed illustrations that characterise Nigel's work.

Conveying complicated subject matter in an easily-understood manner is Nigel's speciality and helps explain his success and popularity as a teacher and mentor. He has been the Technical Director of the successful *Oxford Bunker Course* since it began and regularly teaches and lectures at international events such as *Maritime Week Americas* and *Oil & Shipping Africa*.

Llewellyn Bankes-Hughes
Managing Director
Petrospot Limited

May 2010



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Special thanks are due to Chris Fisher, Alan Rattray and Capt. Cees de Keijzer, who have all kept the author on the straight and narrow.

Thanks must also go to the students on the *Oxford Bunker Course* and other training events for asking an endless flow of questions which provided much of the inspiration for the content.

It is only when reviewing the work that one realises just how much information is generated through discussions with friends and colleagues at conferences, courses, social gatherings and casual meetings.

The author also extends his thanks to Llewellyn Bankes-Hughes and his team at Petrosport for pressing him into writing his third – and longest – book on bunkering. Particular thanks are due to Alison Jane Cutler and Simon Demaine for designing, producing and bringing the book to life.

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Please note: The numerical data in all of the tables except for ISO 8217 in this book is intended for guidance only and may be subject to minor errors of 'rounding' up or down and may be superseded by new methods or precision data as published from time to time.

Chapter 1 - Early days

Steam and coal

When the first steamships emerged in the 1840s they used coal [or wood] as fuel. The fuel was bulky, difficult to handle and required a lot of manpower to load onto the ship, to manage its storage, manage its use in the boilers and handle and dispose of the ash produced.

The coal was stored on board in 'coal bunkers', accessible from the main deck to permit loading and with a hatch opening into the boiler room stokehold from the bottom of the bunker. The coal did not always flow freely out of the hatch and it was routine for the stokers to have to climb into the bunker and redistribute the coal, 'trimming' the bunkers, to ensure a constant supply at the hatch opening.

The coal was supplied at the quay side in ports by the local ship chandlers – many of whom were also ship agents – and for merchant ships the chandler / agent would supply a force of labourers to carry the coal up the gangway of the vessel and tip the fuel into the bunkers. The rapid growth of the world's steamship fleet and the need for the Navies of the colonial powers to have easy access to coal led to the establishment of coaling stations in many ports and to the growth of dedicated coaling stations in ports which were only used for port visits to refuel – the original bunker-only ports.

Coal sellers and chandlers

Some of the chandlers who specialised in coal supply invested in special coal handling equipment and coaling barges. A lot of the coal was moved in railway wagons and by the end of the 19th century, special coaling quays with coal 'staites' allowed the coal to be tipped directly from the rail wagons into the bunker of the receiving ship or into the cargo hold of coal barges. Some of the European companies involved [such as Powell Duffryn and Cory Brothers in the UK] went on to become specialised in coal and then oil distribution.

The early diesel engined vessels, which used gasoil as fuel and first appeared in 1905, were all relatively small and operated in coastal trades in areas where there was a primitive infrastructure that could supply modest quantities of fuel oil.

The change to oil

The big change came as the Navies of the Great Powers realised the amazing savings of manpower and gains in range and flexibility that could be achieved by using residual fuel oil in their big battleships. The principle had been proven by entrepreneurs like Weetman Pearson who started to burn oil on his own tankers in 1908. He had a ready supply of oil from his Mexican refineries but his ships still had to be capable of burning coal as well as oil, in case the oil was not available.

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These vessels were all steamships, of 15,000 deadweight tonnes (dwt). Using oil allowed him to run much more cheaply than his competition.



Figure 1. The early days of bunkering

Photograph courtesy of John W. Whitaker (Tankers) Ltd (www.whitakertankers.com)

Bunker stations and delivery methods

Once they had made the decision, the Navies of the Great Powers then used their taxpayer's money to set up oil bunkering stations at the same ports where they already had coal-bunkering stations. These were initially dedicated to supplying their own warships but after the end of the Great War, the facilities, often transferred to private ownership, were able to offer oil fuel to merchant shipping. The shipping companies did not hang back; from 1920 onward, the change to using oil fuel reached such a pace that by 1940 half of the ships at sea used oil fuel. The product was mostly sold by the oil majors with some of the chandlers also providing a level of supply.

From the start of oil burning, two delivery methods predominated: pipeline delivery and barge delivery.

Most bunker-only ports had a pipeline network where visiting vessels could berth and take fuel ex-pipeline but the attraction of making supply at an anchorage within the port led to the introduction of bunker barges. These were usually quite small – 1,000 dwt was typically the largest size.

Pipeline supplies were established at a considerable number of ports in the middle of the 1900s, usually with one of the major oil companies acting as pipeline operator and supplying their own customers and contract customers of their competitors under what were called 'product exchange' agreements.

Posted prices

The difficulties of efficient communication with supply points spread all over the world had led to the introduction of what were called 'posted prices' (prices fixed centrally at intervals for each port). These were a list of the price applicable for each grade in every port by the particular issuing company. This meant that sales offices could work off a list of prices for every port in their supply network and their only need for communication with the local delivery office was to confirm availability, nomination details and the name of the agent.

All of the oil majors published their own 'posted prices' lists and contracts would be concluded on the basis of 'posted price' less a contractually agreed (usually expressed as a dollar per tonne amount) rebate. As direct telex messages and then medium cost intercontinental telephone links developed, the need for the posted price system disappeared and companies moved to spot prices (a price on the day for each port).

The combination of the 1970s oil crisis, and the emergence of oil traders in main ports, led to a retreat from bunkering by oil majors in ports where they did not have refineries and the collapse of the posted price system. By 1985, it was almost defunct. The lack of flexibility, increasing demand (and stem size) and the high cost of maintenance led to the retreat from pipeline supplies towards the end of the 1980s.

The majority of barges used for bunker supply were owned and operated by the oil majors, although some of the old coaling operators had bunker barges operated on their own account or on charter to the oil majors. By the mid 1920s, many of the bunker barges were older coastal tankers which were relegated to bunker duties. Some were used as oil storage hulks in ports where tank space was at a premium. By 1980, the oil majors were retreating from barge owning and operating, reluctant to invest directly in new tonnage and wanting to distance themselves from the delivery operations. New barge operating companies moved in, initially with second hand tonnage, and they delivered on behalf of the whole range of sellers, from oil majors to local independents. The advent of strict legislation on barge quality and barge design has encouraged complete renewal of the barge fleet worldwide.

We have moved from a brand new system of fuelling ships where everything was improvisation and the market was dominated by the oil majors, through the mature and somewhat run down bunker industry of the 1980s, with its problems of quality, disputes, old equipment etc., to the challenge of the 21st century with new investment, strict quality controls and a market which is well balanced between majors, independents and national government-owned companies.

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Nigel Draffin possesses a depth of knowledge and understanding that is very rare in the international bunker industry. His easy language and clear descriptions belie the complexities of bunkering and shipping and, with this book, Nigel captures the key elements of bunkering in a way that will enhance any reader's appreciation of this complicated business.

An Introduction to Bunker Operations is the third in a series of informative books by Nigel, and follows *An Introduction to Bunkering* (2008) and *An Introduction to Fuel Analysis* (2009), both of which have now become staple reading material for newcomers and more established players alike.

The book is crammed with photographs, charts and diagrams intended to help the reader visualise important aspects of bunker operations, from flanges, hoses and samplers, to barges, pipelines, road tankers and storage tanks. It covers everything that needs to be understood and remembered, from plugging scuppers to fastening bolts on a bunker flange, and covers storage, measuring, delivery, sampling and handling of bunker fuels and debunkering.

An Introduction to Bunker Operations is packed full of detail and provides a plethora of other useful information, including a comprehensive index and an appendix designed to help the reader quickly locate exactly what he or she needs to find. In short, this is a book that no-one involved in bunkering operations – on land or at sea – should ever be without.

Nigel Draffin has been involved in shipping for over 44 years and with the commercial bunker market for over 24 years. He is a founder member of the International Bunker Industry Association (IBIA) and has served several times on its council of management and executive board, most recently as Honorary Treasurer.



He is co-ordinator of IBIA's Education Working Group and author of IBIA's *Basic Bunkering Course*. Nigel Draffin is also the Technical Director of the *Oxford Bunker Course*, a member of the Institute of Marine Engineering Science and Technology and Past Master of the Worshipful Company of Fuellers.

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